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THE VETERINARY JOURNAL.

A Monthly Review of Veterinary Science.

Editor :

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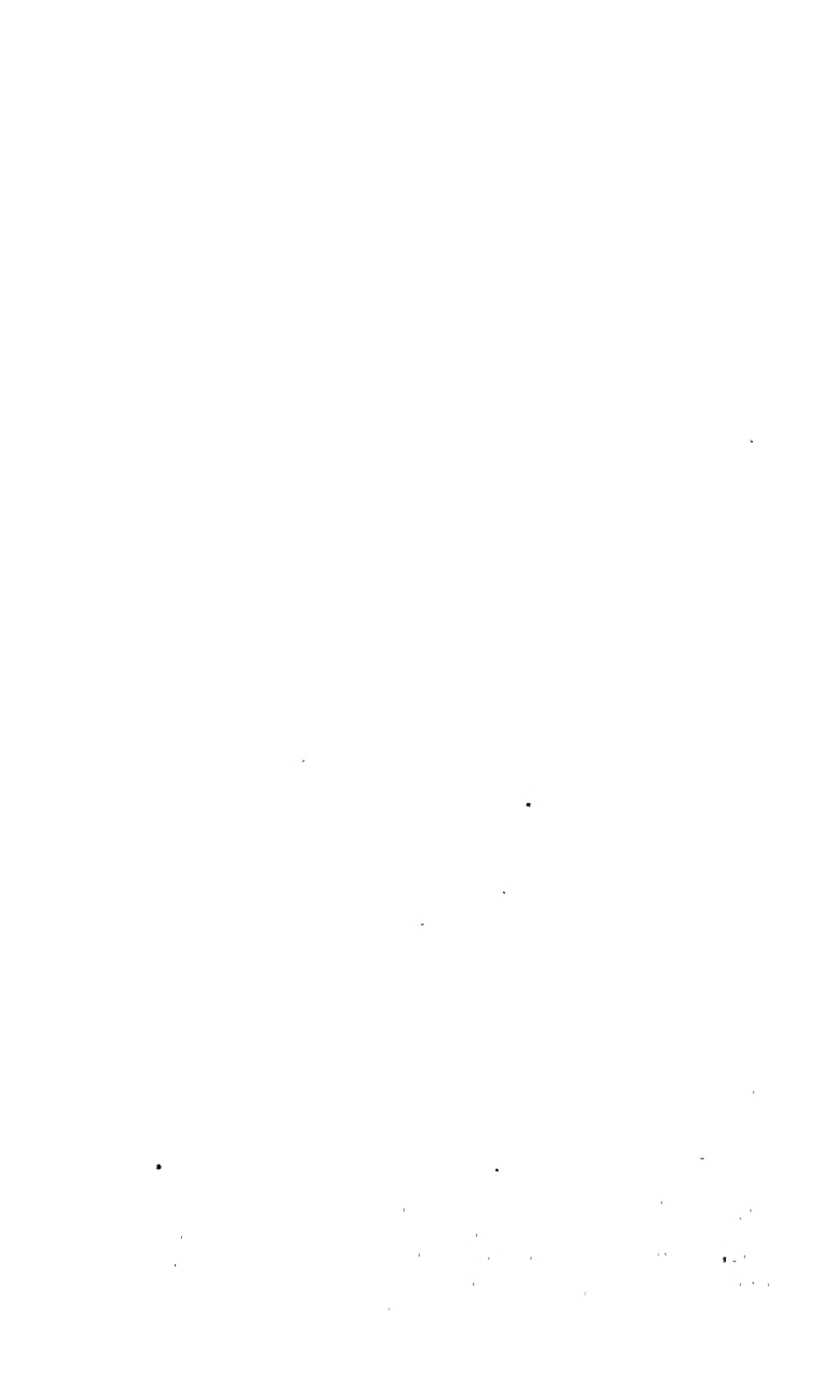
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HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING;
MAJOR IN THE ARMY VETERINARY CORPS, AND FORMERLY PROFESSOR IN
THE ROYAL VETERINARY COLLEGE, LONDON.

JANUARY, 1917.

Editorial.

LOOKING FORWARD.

THE popular Parisian prophetess, Madame de Thebes, recently deceased, is said to have predicted that the war would come to an end in 1917. Let us hope it will, and that when it ends, crowned by a glorious victory for the Allies, we shall have got rid of the slackness, as a Nation, that has distinguished 1916, and have profited by the lessons learned in the expensive school of experience. Nothing but a cataclysm could have got us out of the old unproductive and profitless ruts and the upheaval has come by a quicker way and in a manner different from what we expected.

Agriculture, commerce and organisation, instead of being treated as side lines are now to be given the status and significance in the State that only a stupid and perverse blindness and inertia have prevented us from recognising and uplifting ages ago. We are concerned in the revival, and we hope that we may be found awake and alert and able to take a profitable and praiseworthy hand in the ploughing of the productive furrows. Years ago, John Bright said in one of his prophetic speeches—"The time will come when your mansions will be deserted and your factories silent, and your country will be a corn-producing and exporting one, depending for its

existence solely on its agricultural produce." That period may be far off, but the day for the uplifting of agriculture looks as though it has already arrived. Food control is no good without greatly increased food production, and in the lucid words of the Prime Minister "every available square yard must be made to produce food, and labour available for tillage should not be turned to more ornamental purposes until the food necessities of the country have been adequately safeguarded." All the activity got going, and with a real live head at the Board of Agriculture there ought to be hopeful and happy days in store for us. The Board has often been the butt of sarcasm and ridicule, but then it has perhaps never been remembered that no Government Department has suffered more from chameleon-like changes of head. Nothing very stable can result where alteration of directing and planning is constantly occurring, and surely it is time the Board of Agriculture was given a cardinal place in the Departments of State and more continuity of direction in its work.

The times before us are pregnant with possibilities and fraught with great issues and we hope that 1917 will be the commencement of an era of plenteous work and renewed prosperity for us. We want, however, to keep our claims in the limelight and be stern and earnest in our endeavours to secure the work in the Kingdom that is ours by right and by ability. All movements to supplant us must be determinedly met and charlatans posing in our domains must be sent to the right about, hence the importance of supporting our Council financially.

G.M.

ANTI-VIVISECTION.

The following reply was sent by Mr. Scott, F.R.C.V.S., to the circular from the Anti-Vivisectionists, published on pp. 416 and 417 of our December issue:—

To the Secretary, World's League against Vivisection for the protection of animals.

SIR,—Last winter I was veterinary officer in charge of a mule depot carrying over a thousand mules. A specific infectious and highly-dangerous disease broke out on the depot,

necessitating the picketing of every mule. These mules remained picketed all through the cold, wet winter months, and in exposed areas, and not a single mule died from such exposure. On the other hand, had picketing measures not been enforced the disease would undoubtedly have spread, necessitating the destruction of many mules, and consequent loss to the State, but what is perhaps more important, the disease in question often runs a latent and insidious course, consequently many mules, *apparently* healthy, would have been issued to other units, thereby spreading the disease broadcast. I appreciate your efforts of sympathy towards the servant and friend of man, but I cannot subscribe to any League whose endeavours, however well intended, would diminish in the smallest possible degree the efficiency of any government department whose primary object is to win the war at all costs. I beg, therefore, to give you my experience of picketing for what it is worth on the principle that an ounce of experience is worth a pound of mis-applied sentiment.

Yours very truly,

WM. SCOTT, F.R.C.V.S.

Bridgwater.

ERRATA.

On p. 399, John Vincent Holland, M.R.C.V.S., should be Lieut. J. V. Holland, V.C. Lieut. Holland was formerly a student at the Liverpool University.

On p. 405, lines 1 and 23, read sodium nitrite, instead of sodium nitrate.

On p. 405, bottom line, read .5 per cent. instead of 5 per cent.

On p. 407, *Vesical* instead of *Vesicle*.

The Value of the Intra-Dermo-Palpebral Method of Malleinisation

In the December Number of the VETERINARY JOURNAL, in the article on the above subject by Major Hobday, it should have been stated that the original research which resulted in the adoption of the intra-dermo-palpebral method, was the work of M. Naudinat, a note of it being first published in a communication made before the Société Centrale de Médecine Vétérinaire, on the 17th of July, 1914.

The advantages of the method were at once recognised, and the collaboration and further research of M. Victor Dronin, established its value beyond question in eradicating glanders from the large omnibus and tramway studs of Paris.

Original Communications.

WAR PICA.

By R. C. G. HANCOCK, Capt. A.V.C.

TWO autumns spent at the front among artillery horses has given the writer some experience of colic, and especially of a colic due to accumulation of inorganic material in the large colon.

He would venture to dilate on this affection, in the nature of comments upon the exemplary article by M. F. Friez on the subject of Sand Colic. It is assumed that this article has been studied by those who read the following.

That at the front a number of cases of colic, with a large proportion of fatalities, is due to impaction of the second portion of the large colon with inorganic material, is well known. The nature of the accumulation depends upon the nature of the soil upon which the animals are stationed. Its location is due to the fact that the large colon bends upwards upon itself at the pelvic flexure, becoming considerably narrower at this point. Passing ingesta thus flowing from a large to a small tube have also to climb uphill and round a sharp corner. Hence heavy material is likely to slip back again during this passage, and any quantity is likely to remain there and accumulate, unable to negotiate the passage.

Etiology. (1) Food. The army ration, particularly of hay, is about adequate (for light draught horses) under summer conditions. Place these same horses, as they often are placed at the end of autumn and early winter, in an open field, without protection from wind or rain. The army ration becomes insufficient to supply the demand for extra animal heat, work and other conditions remaining as usual. The animals become perpetually hungry. One observes practically every horse in his idle moments between feed times, licking at and ingesting the mud and sodden turf upon which he stands. This is not pica in the true sense, for it is not morbid appetite, simply the unsatisfied physiological appetite of a stomach that calls to be filled. Place hay before these horses, and as long as it is there, or so long as they have their fill of it,

this so-called pica will not be observed. The writer suggests, *faute de mieux*, the term war pica for this condition, for it is essentially a condition associated with campaigning.

(2) Feeding off the ground. This is a far less important factor in the causation of this so-called sand colic, than the insistence on its avoidance in his division led the writer at first to expect. Considerable observation of horses feeding off the ground, both hay and cats, convince him that horses are extraordinarily deft in their avoidance of gathering foreign material when so feeding, and that aggregation of sand is hardly likely to be due to this cause, save after a very long period perhaps.

3. Water. This, if muddy, is undoubtedly a cause. But as this colic is so frequently encountered where the water is beyond reproach, it may be considered a subsidiary factor, and is not encountered where discipline and management are up to standard.

It cannot be too often reiterated that in the writer's opinion sand colic in the Army is due to pica, and pica in turn is attributable to environment and conditions at the time rendering the ration insufficient for the animal's needs.

Symptoms. It is doubtful whether the terms complete and incomplete obstruction bear examination. From the facts it appears that colic is evidence of a complete obstruction. Granted that this may be momentary, or of a few hours' duration only; but in any case for the time being it is complete.

The fact appears that when the aggregation reaches a certain bulk, the animal stands in danger at any moment of a temporary or (at the worst) permanent obstruction of the bowel at the pelvic flexure. When this occurs colic is evidenced shortly, and continues until the obstruction passes on, falls back, or is overcome by treatment.

The symptoms thus show themselves seriatim from mere uneasiness to acute agony, and one case may run the gamut of almost all the known symptoms of colic.

Yet constantly one may rely on encountering the following at any stage. Harsh staring coat, hide-bound skin, mouth with more or less dirt inside, rectum gives gritty sensation to hand and arm. Presence of impacted mass before pelvic flexure.

Diagnosis.—This depends on the last-named symptoms and is usually easy. The complications that ensue vary with individual cases, which can only be recognized on their respective merits.

Prognosis.—Impossible.

Lesions.—As described by Mons. Friez.

Treatment.—(a) Preventive: Hay, little and often, in hay-nets, the idea being to keep horses occupied with food as many hours in day as possible. Supplement army ration to every possible extent, wind shelter, head cover, hot feeds occasionally. Remove to solid standings whenever possible. Water: if incriminated disciplinary measures against watering from shell holes, driving into streams, etc., are usually effective.

(b) Curative. The following is as near a specific as the writer knows.

Ol. lini.	...	...	...	...	Oil.
Ol. Ricini	...	...	...	...	3vi.

Copious warm enemata are invaluable. It is astonishing what a horse can hold if instructions as given by M. Friez are faithfully followed.

Massage of impacted bowel, massage (not surface rubbing) of abdominal wall, hot packs, freedom to roll at will. In some cases a sharp trot or even a canter bring prompt relief.

Finally, rectal examination of horses in like conditions will show those to which it may be advisable to administer a purge as a preventive measure.

STRICTURE OF THE PYLORUS IN CATTLE.

By PETER WILSON, M.R.C.V.S.,

Lanark.

IN the following note I will endeavour to draw as accurate a picture as possible of an uncommon disease affecting cattle, which I have not seen described in any professional literature to which I have had access. It may nevertheless be quite well known, and if this be so I can only ask the indulgence of your readers.

I have not seen many cases of the disease, and the first one I saw I failed to arrive at an accurate diagnosis.

History.—When first called into the case, one is generally told that the cow has not appeared quite her usual self for a day or two; has been dull, off her food, given rather less

milk, and is somewhat constipated, or has not been passing a normal quantity of fæces, although of normal consistence.

Symptoms.—The cow, to look at, does not seem to be seriously ill. The eye is dull, general appearance sluggish, surface temperature somewhat irregularly distributed, and fæces seen, appear to be well digested, but small in quantity.

The pulse is about 72 per minute. The temperature and respirations are normal. Auscultation of the stomachs shows normal movements of the rumen, but very weak movements of the omasum.

Observation of the contour of the abdomen shows that the left side over the rumen is full, but that there is not so much distension on the right side as one would expect from the small quantity of fæces said to have been passed for a day or two. At this stage one is liable to set it down as a case of atonic indigestion, and to expect a dose of medicine, followed by some stomachics to put the animal all right.

However, on visiting the case again three or four days later, one gets the following history:—The physick worked normally. The cow ate well for a day or two after, and looked like making a good recovery, but somehow she has gone back into a state pretty much like her previous condition. She is again only passing fæces seldom, and in smaller quantities than is to be expected, considering the amount of food she has been taking. The surface temperature has been changeable. She is again giving less milk than normally.

An examination reveals the pulse, temperature, respirations, and the shape of the abdomen nearly similar to their condition at the first examination. Another dose of purgative medicine is given, and the stomachic powders are made so as to be laxative.

Again there is improvement for some days, to be followed by another relapse into an unsatisfactory state.

This alternation of improvement and relapse may go on several times without much alteration in the general state of the animal. But after the second or third dose of medicine each subsequent dose is noticed to bring away a smaller quantity of fæces, and the improvement is of shorter duration. There is also noticed to be a change in the contour of the abdomen. The appetite fails and rumination ceases.

It generally takes three or four doses of medicine before one sees any diminution of the bulk of the rumen, even although after the third dose the cow may not be eating very much. The rumen about this time begins to act less forcibly and less frequently than normal.

It is quite evident now that the rumen is getting empty (even very much so) from the hollow appearance of the left side; and because of the small effects of the medicine administered, one wonders where the contents of the rumen are going to, until one begins to realize that the right lower part of the abdomen is becoming enlarged and depressed looking, and very hard, even solid, to the touch over the seat of third and fourth stomachs.

I detected the hardness here in my first case when auscultating the region by the ear. It was so unusual a sensation that it led me to have a good look at the abdomen, when the change in shape, stated above, was noticed, and the hardness could be felt quite easily by the hand. Auscultation also now reveals the absence of all peristalsis in this region.

When this stage is reached, purgative medicine produces no result except the passing of some liquid in which there may be floating some particles of unmasticated straw.

Still for a day or two longer the rumen gets emptier, the left side more hollow, and the right side of the abdomen fuller and more depressed, before much change is seen in the general condition of the animal, except that it has lost some condition and is weaker.

However, about this time, there is an increase in the pulse rate, up to 85 or 90; the temperature goes up to 103 or slightly over, and the respirations get a little more frequent than normal. In a day or two now one finds speedy alterations for the worse. The pulse advances to 100-120; the temperature goes up to 104-105; the respirations become very fast; there is a grunt, and some pain may be manifested on pressure over the right anterior part of the belly.

The case is now evidently complicated with inflammation, and before long death ends the scene.

Post-Mortem.—On a post-mortem being made, when the abdomen is opened one is absolutely astounded at the enormous

size of the third and fourth stomachs. At the first glance they look like the rumen, but the rumen, because of its small size, is quite inconspicuous. On removing the abdominal organs for more minute examination, the rumen is found to be very small and nearly empty, the second stomach not departed from the normal, the third and fourth stomachs are, however, greatly distended. The third may be three times its normal size, and the fourth is as large as the third, if it is not larger. The bowels are entirely empty.

On opening the third and fourth stomachs, they are found to be distended with practically the normal contents of the rumen: that is, the contents of the rumen have passed into them without having been rechewed. The contents of these stomachs are therefore very coarse.

On removing the contents, there does not appear to be any disease about the third stomach further than the alteration in size and shape. The fourth stomach, besides being greatly changed in shape, shows some inflammation of the mucous membrane of the pyloric half. Manipulation of the pylorus and a short distance of the duodenum shows marked thickening and hardness of the tissues. The pyloric orifice is so small that one has considerable difficulty in forcing a finger through it into the duodenum.

On splitting it open there is seen what appears to be a great increase of fibrous tissue from the submucous coat outwards. The mucous and submucous coats show recent inflammation with inflammatory exudation into them. The signs of acute inflammation extend for some inches along the duodenum.

In one case a piece of coal, the size of a hazel nut, was fixed in the entrance to the pylorus, and the mucous membrane had on it a superficial ulcer. The other internal organs appear to be perfectly normal.

The post-mortem makes the symptoms easily understood.

The disease begins as a slow chronic inflammation of the pylorus, which causes no symptoms until it has advanced sufficiently to produce more or less obstruction. It is then the symptoms of indigestion and constipation are noticed. The constipation is more apparent than real, being due to the slow passage of the contents of the fourth stomach into the bowels,

reducing the amount of their contents, and giving rise to less frequent evacuations.

Laxative doses of physic and stomachics relieve the condition for a short time only. The animal soon becomes as bad as ever.

The third stomach is inhibited to compensate for the state of the fourth, and rumination is less active so that the rumen does not become emptied as quickly as one would expect at the commencement of the disease. But as the disease progresses the inhibition in the third stomach appears to be removed or paralysed, and for this reason and, further, because the rumen never ceases altogether to act until the very end, the contents of the rumen pass on without being remasticated and become lodged in the third and fourth stomachs, and gradually produce the distension of these stomachs, until their dimensions become something enormous.

Except close to the pylorus, the contents of the third and fourth stomachs are as coarse as the contents of the rumen.

The pressure and irritation of the contents cause acute inflammation of the fourth stomach and pylorus. This, perhaps, combined with some auto-intoxication, causes the great increase of the pulse rate, high temperature, frequent respiration and grunt, with other symptoms of acute pain, and leads to a rapid death, owing to the weak state of the patient by this time.

The disease runs a course of between two and three weeks.

Treatment.—So far treatment in my hands has been unsuccessful. I have tried oil, Epsom salts, treacle, aloes, aloin and calomel at different times, in doses sufficient to open the bowels. As stomachics, sodii. bicarb., potass. bicarb., ammon. carb., ammon. chlor., potass. chloras. sodii. hyposulphis, aloes, aloin, ipec, belladonna ext., nux vomica and vegetable bitters in various combinations have been given. Hot cloths to the belly and blisters over the third and fourth stomachs have been applied when any signs of pains were seen. Death however has always been the end sooner or later.

From the post-mortem findings, it appears to me that the disease is not likely ever to yield satisfactorily to medicinal

treatment, unless it be to that of potassium iodide, which might be tried on a very valuable animal.

Surgical intervention, even if it were possible, would not pay anyone.

The disease might be named stricture, stenosis or simply obstruction of the pylorus in cattle.

THE TREATMENT OF GANGRENOUS MAMMITIS IN CATTLE.

By J. H. RIPLEY, M.R.C.V.S.,
Hurst Green, Sussex.

WHILST the cause of this condition is obscure and the diagnosis fairly easy, the successful treatment of the disease is not always certain. In a small percentage of cases nature herself would prevent a fatal result, but in most instances it is only by surgical interference that death can be averted. Gangrene of the gland takes place before the skin becomes similarly affected, and the cow is very seriously ill from septicæmia. Hence, if one waits for gangrenous skin before incising, there is less chance of a cure. On the other hand, the vascular condition of the skin of the udder hinders the unrestricted use of the knife during the initial stages. I have recently had three cases; one was lost due to waiting, and two recovered by adopting the following treatment.

As soon as diagnosis was certain, chiefly by noting the thick, bloody fluid obtainable from the teat in conjunction with the general symptoms of septicæmia, some five or six deep narrow incisions were made into the udder substance by means of an abscess knife. These were about 2 inches deep, but only large enough to admit the nozzle of a brass (pint) enema syringe. These wounds were then syringed three times a day with hypochlorous acid solution.

R. Calx Chlorinat	...	...	...	5i.
P.Ac. Boric	...	...	...	5i.
Aq.	...	...	...	Oiv.

Next day, and on subsequent visits, the punctures were enlarged, and eventually by joining one to another, a long (6 or 7 inches) skin incision was formed.

Adhesions of the gland to the skin that could *easily* be broken down by the fingers were thus dealt with, but undue eagerness in this direction produced copious bleeding, which had to be checked by plugs of tow soaked in turpentine and oil.

The continued syringing with the lotion and turpentine internally completed the cure—the dead gland-substance sloughed out of the skin wound, and healing occurred.

The chief points are that this method allows active treatment to be begun early, and that a lot of manual interference in getting the gangrenous gland away is avoided, also the condition can often be limited to one-quarter, whereas otherwise it usually tends to affect both quarters on one side.

This is one more instance of the value of hypochlorous acid solution in the separation of gangrenous from healthy tissues.

TRAUMATIC DIVISION OF THE DEEP FLEXOR TENDON BELOW THE INSERTION OF THE SUPERFICIAL DIGITAL FLEXOR.

By J. V. LACROIX, D.V.S., Prof. of Surgery,
Kansas City Veterinary College.

THIS cumbersome title designates an affection of which comparatively little has been written, but a condition that always causes the practising veterinarian real concern, particularly when he handles his first case of the kind. The matter and manner of caring for such a wound, because of the character of the structures involved, and the peculiar function of the deep flexor tendon (particularly its function in relation to the maintenance of the foot in its normal position) constitute problems that seem almost insuperable. The open tendon sheath and the probability of purulent synovitis resulting; the likelihood of extensive adhesions occurring, even though the subject should not succumb to the ravages of the affection; and the cost of efforts to properly treat the wound and to keep the patient comfortable throughout a protracted period of convalescence, are questions that present themselves to the practitioner and tax his judgment and discrimination.

Fortunately, such cases are of infrequent occurrence, and

when observed, in some instances, they are obviously so hopeless that the victims are humanely destroyed forthwith. In parts of the United States where barbed wire is employed for fencing pastures and even paddocks and narrow lanes, horses sometimes paw into the lowermost wire on such fences; and as soon as the pain inflicted by the barbs is felt, when this happens, the subject immediately makes violent efforts to free himself, the result is that a deep lacerated wound is made and the tendon may be divided. This particular injury, however, is only one of the many types of wounds that are so occasioned. As a result of runaways, with ploughs, disc harrows or other farming implements, this sort of injury is occasionally produced. Suckling colts that are allowed to follow their dams in meadows at mowing-time may be cut with the sickle and injured in this manner. So in one way or another, horses, young and old, suffer this trauma, and, unfortunately, in some instances, the gravity of such affections is not appreciated by the owner, and an already difficult case is complicated by delay in calling the veterinarian.

The true character of the wound is at once evident in such cases, because of the unnatural position of the toe—raised from the ground when weight is borne by the affected member. Depending upon the length of time that has elapsed since the wound has been inflicted, so its appearance varies. This, however, differs in no wise, in such cases, from other wounds of the extremity wherein the tendon sheath has been invaded. Such wounds are always contaminated and often, because of the lacerated condition of the parts, contagium is distributed into innumerable recesses and cleansing the wound is rendered very difficult.

Complete division of the deep flexor tendon of the digit (perforans) below the point of insertion of the superficial flexor (perforatus), in addition to causing an open tendon sheath, severs the only structure which maintains the normal relation between the second and third phalanges (ossa corona and pedis).

To maintain the divided ends of the tendon in position of constant approximation necessitates the fitting of a specially constructed shoe with raised heel and braces for the extremity, all of which requires an expenditure of time and energy that

are considerable. And, furthermore, the subject is occasioned much distress by the constant pressure of these rigid appliances and the unnatural position that the foot is forced to assume. Experience has taught the writer that the use of special shoes and rigid braces are certainly unnecessary in such cases in colts, and, in handling a few of these cases in mature and aged subjects, it was found that other means are probably preferable in most instances in these subjects as well.

A prerequisite in the successful handling of these cases, of course, is the thorough cleansing of the wound as soon as possible after it has been inflicted. While a delay of as much as a week's time is not necessarily cause for unfavourable outcome, yet, disinfection of wounds so neglected is almost impossible, and chances for recovery are greatly diminished.

The subject should be cast and properly restrained. The region surrounding the wound must be freed from hair for a distance of several inches; pledgets of cotton saturated with a suitable antiseptic solution (formalin, one to two-thousand serves well) are used to cleanse the area surrounding the wound; all shreds of tissue are trimmed away with scissors and, in wounds of several days' standing, the curette may be necessary to remove necrotic tissue and eschars. The wound is then bathed with tincture of iodine. Two or three minutes' time are allowed for the drug to contact all accessible parts and the skin surrounding the wound is also moistened with the tincture. Having in readiness a good, long-fibre cotton, the practitioner would do well to apply a large quantity of this material around the extremity. The wound and a sufficiently large area adjoining the wound is so completely invested with the cotton that contamination of the injured tissues is impossible as long as the parts are thus protected.

Forty-eight hours afterward the animal is again cast (if it is not very tractable) and conditions are noted. If one has been thorough in the initial wound cleansing, little pus will have been produced. And if the wound is in a reasonably good condition, it is simply mopped with pledgets of cotton, thoroughly moistened with tincture of iodine and rebandaged. If, on the other hand, there are copious quantities of pus present, in addition to the aforementioned treatment, tincture of iodine is carefully injected into the tendon sheath with an

ounce syringe. As much as two ounces of the tincture may be employed in this manner with profit and the cotton and bandages are then immediately applied.

In the badly infected wounds it is necessary to dress the parts twice weekly subsequent to the second handling of the subject. But in wounds that are promptly attended to after injury, weekly dressing is sufficient, and, ordinarily, four or five treatments are all that is required. The last dressing is kept in position for two or three weeks, and, thereafter, protection for the wound is unnecessary.

During the time of treatment, colts are given the freedom of a clean and roomy box stall. Horses that are broken to halter and to harness may be supported with slings, in front-foot affections, and also when a pelvic member is so wounded, if subjects derive more comfort from this manner of treatment.

It has been apparent to the writer that time given to cleansing wounds at the first treatment is profitably spent. In fact, thorough cleansing of these wounds is a determinant factor. Likewise, great care in keeping the parts free from contamination after they have been disinfected is necessary. Rigid appliances are unnecessary to keep the ends of the divided tendon in approximation. In young animals (up to three years of age), at least, such means are of no use. And, finally, regeneration of destroyed tissue and complete restoration of function succeeds proper treatment in the majority of cases within from two to six months' time.

Clinical Cases.

"SNORING IN CATTLE."

By J. H. PARKER, M.R.C.V.S.,

Faringdon.

YEARS ago, when I first commenced practice, we used to attribute this disease to a tumour in the throat, and in bad cases advised slaughter. After reading a description of the disease and means of operating, by Mr. C. J. Cunningham, of Slateford, I had to go at it, and was surprised to find what a comparatively easy operation it was, and one which gave

great satisfaction to the client. The following is a typical case. On October 1st last, called to a two-year-old Shorthorn heifer, said to have a rattling in the throat. Heifer otherwise all right. Advised a wait and see policy. The noise in the throat gradually increased, until she began to snore badly and cough when feeding, and breathe through her mouth, her cheeks puffing out with each expiration. I was certain then there was an abscess in the throat, and told the owner so. After fasting twelve hours we cast her by the Russian method, and chloroformed her. Putting a Revelation mouth-gag in her mouth, I could easily feel the abscess in the roof of the pharynx. This I split from end to end, making a good opening, with a Farmer Miles' hooked castrating knife, and let out about $\frac{1}{2}$ pint of thick foetid pus, some coming out of the mouth and the other from the nostrils. When the heifer got up she had practically ceased snoring. Made an uninterrupted recovery, and was eventually sold. I much prefer to chloroform, as the animal does not struggle, and there is less fear of asphyxia or getting your hand badly bitten should the gag slip. I have never yet found a snorer that would pass the tuberculin test, so the abscess is evidently of tuberculin origin.

OBSCURE LAMENESS IN THE DOG.

By G. YATES, F.R.C.V.S.,

Harrow.

THE first case, an aged fox terrier having been knocked over by a motor car, I found upon examination to show all the symptoms of radial paralysis as met with in the horse. The elbow of the left foreleg was dropped, and lower than its fellow of the opposite side; the carpus was extended, and there was complete inability to maintain weight on that side, whilst there was not the slightest evidence of pain on manipulation.

The case was under treatment for about six weeks without any improvement, the scapular and caput muscles wasting away, the animal unable to use the limb, simply carrying it during progression. As the animal was an old favourite, and the condition not a painful one, the owner decided to let

it take its course, and it is to-day, after a period of about six months, exactly in the same condition, and suffers nothing in consequence.

The second case occurred in a fox terrier, also an aged one, but affecting the near hind leg. It was inadvertently trodden upon by its owner, a very heavy man, and showed immediate signs of lameness and pain. The latter soon passed off, but the leg became quite powerless, and dropped on that side; the muscles in time wasted away, the bony skeleton being well outlined. Similarly in this case treatment proved of no avail.

Remarks.—In neither case, after most careful and frequent examination could a fracture be detected, the damage, in my opinion, implicating an important nerve, although in the latter case, after being under treatment for about two months, a so-called veterinary chemist was said to have diagnosed a fracture, which had it been attended to earlier would have resulted in complete recovery. Fortunately, in both instances, I was very guarded as to prognosis, and probably the advanced age in both cases was responsible for their non-recovery.

General Articles.

URINARY CALCULI WITH A REPORT OF SIX CASES OPERATED AT THE UNIVERSITY HOSPITAL.

By J. H. SNOOK.

THE normal urine contains several salts in solution and under abnormal conditions (Lithuria) may contain an excess of the normal salts and possibly others not commonly found in the urine.

Depending on conditions, any one or more of these salts may be precipitated and deposited in the form of urinary calculi. A nucleus is necessary for the beginning of a calculus and this may be a mass of mucus, cell debris, blood clot, or other substance. On or in this nucleus the first precipitated salts are deposited and from this beginning it continues to grow by accretion. The rate of growth, which is at all times slow, is in accordance with the amount of salts present in the urine, and as this amount varies greatly at times the rate of growth necessarily varies. The variation in the kind of salts in the urine

from time to time will form alternate layers of the different kinds of salts.

As a calculus enlarges, especially if cystic, it causes irritation of the mucous membrane and this favours bacterial fermentation of the urine with ammonia production and an alkaline reaction. This alkalinity favours a precipitation of phosphates so that most large cystic calculi have an outer covering of these salts while the inner parts may be composed entirely of others. The density and hardness vary with the composition. Those composed of urates are not as hard as those containing calcium compounds.

Calculi of the horse and dog are usually single while those of cattle are most often multiple and in the form of irregular masses, commonly called sand, or gravel, depending on their size. They may occur anywhere along the urinary tract although the bladder is the most favourable location. They may also form in the renal pelvis and pass with the urinary current to other parts of the tract or possibly be expelled along the urine. Remaining in the kidneys they enlarge and assume the shape of the pelvis and in time gradually interfere with, and finally suppress, the flow of urine from the affected organ. Inasmuch as this condition is usually unilateral and of slow formation, few, if any, symptoms will be noticed. The compensatory hypertrophy of the other kidney makes possible the excretion of the normal amount of urine.

A small renal calculus passing into the ureters may lodge there and produce marked acute symptoms of retained urine since stoppage of one-half the flow so suddenly does not permit of compensatory action of the opposite organ. Both renal and ureteral calculi favour suppurative nephritis. However, these conditions are extremely rare, difficult to accurately diagnose in all animals, and subject to surgical treatment only in the smaller ones.

In the urinary bladder a calculus may grow to an immense size (20 oz.) They are easily diagnosed and, ordinarily, may be readily removed by surgical means. When single and of ordinary size they occur almost spherical, but the larger ones are usually irregularly elongated and flattened dorso-ventrally. This shape is due to a more rapid deposit of the salts on the lateral surfaces, or what would be the edges of the calculus as

this surface is at all times bathed with the urine. The ventral surface, in contact with the bladder walls, does not receive as much of the deposit of salts. The dorsal surface may not, for a greater part of the time be covered with urine, as the irritation of large calculi induce frequent micturition. This rapid deposit at the edges also accounts for greater roughness usually noticed at this part of the surface and this roughness at the edges greatly increases the difficulty of removal. This may be overcome to some extent by placing lithotomy forceps over the edges of the calculus rather than over the sides. The forceps placed over the edge will give a greater total circumference than if placed on the sides, but this slight increase in circumference will be offset by the ease with which the urethral mucosa slips over the smooth surface of the forceps as compared to that of the rough calculus.

In the horse, cystic calculi cause little if any trouble until they reach the size of a small hen's egg. From that size up they induce gradual increasing symptoms of irritation indicated by frequent micturition and tenesmus. This is increased when the animal is exercised and blood often passes with the urine, during or immediately following exercise, which indicates injury to the cystic mucosa by the calculus. This constant irritation results in a chronic thickening of the bladder wall and must be taken into consideration when estimating the size of the calculus per rectum.

If a calculus of just the proper size passes into the urethra it may lodge and will interfere with or prevent the passage of urine. The point of most common lodgement varies in the different animals owing to the arrangement of the urethra. The ischial flexure of all animals offers some chance for lodgement but the pressure of the urine usually forces them beyond this point. In the horse the common location is in the dilatation just above the processus urethra, which is constricted sufficiently to retain them. In the ox they stop in the sigmoid flexure, while in the dog they locate just above the os penis.

A urethral calculus will produce acute symptoms owing to a sudden blocking of the urethra. Some cases permit the urine to be voided very slowly and this may continue some time without becoming serious. Usually the urine continues to dribble very slowly and the bladder is distended. The animal makes frequent attempts to urinate and shows pain not unlike that of indigestion. Cessation of pain after thirty-six to forty-eight hours indicates over-distension of the bladder with partial rupture and uremia. Diagnosis of an obstruction is

easy from the distended urethra above and a calculus may be recognized with a metal catheter or probe.

In all cases where one calculus is found it is advisable to palpate bladder for others, and if found remove them to prevent a recurrence of the trouble. This is especially true in the ox, where they are usually multiple and form quite rapidly. A case is reported in which the growth was so rapid that they would pass into and obstruct the urethra so often that it was necessary after two or three operations for removal to maintain an opening at the ischial flexure until the animal could be prepared for slaughter.

A calculus may be removed from the distal end of the urethra of the horse by manipulation. In the ox and dog, because of a higher location, an incision must be made directly over the enlargement and just large enough to remove it. The wound need not be sutured unless quite large, and then it may be closed only at the upper part and an opening left at the left lower commissure for drainage and the skin incised lower than the urethra to prevent retention of the urine between the skin and urethra.

An examination for calculi is indicated in all cases of urinary disturbance, and especially in all chronic cases the bladder must be carefully examined by rectal palpation. It has been our observation in most cases of this kind with beginners that the hand was inserted too far into the rectum and the bladder over reached. The calculus, by reason of its weight, lies in the depression in the floor of the pelvic canal farther posterior than the normal position occupied by the bladder when filled with urine. Also in these cases the bladder will contain very little urine owing to frequent micturition.

Operation. Cystic calculi $2\frac{1}{2}$ inches in diameter or less occasion very little difficulty in removal, but the danger of operation and difficulty increases in proportion to the size of the stone. Complete anæsthesia favours the operation by relaxing the muscles. Insert a catheter and perform urethrotomy at the ischial arch on the median line and enlarge the incision upward to the length of 2 inches. Enlarge later if necessary. Insert lithotomy forceps through the opening into the bladder with one hand in the rectum. By careful manipulation place the forceps, if the calculus be flattened, over the edge. Rotate the forceps while holding the calculus loosely to free any part of its folds that may be caught. Attempting to withdraw the calculus it will readily pass into the urethra and be retarded there by catching in the folds of the urethral mucosa. If it

be impossible to remove it on this account incise the folds of the urethra upward, being careful not to injure the rectum. It is surprising how large a calculus can be readily removed.

Examine the bladder for others, then irrigate with warm antiseptic solution. It is necessary to suture the incision but when the animal is standing the incision in the skin must be lowest to prevent retention of urine just under the skin.

Healing occurs readily and with very little swelling.

Case No. 1. C.B. No. 3396, January 28, 1916. Calculus No. 4. Bay gelding, nine years old, weight 1,200. Condition excellent. Animal sent to hospital by neighbouring practitioner. Two months previous owner noticed frequent urination. Medical treatment was given without examination. An increase in the symptoms, this time blood being passed after exercise, induced the veterinarian to examine the bladder and a calculus was diagnosed. The animal was dieted for twenty-four hours, placed on the table and the calculus removed under chloroform anæsthesia in about twenty minutes. Recovery occurred without incident. Swelling or suppuration of the wound was scarcely noticeable and the animal taken home in five days. This calculus weighed 7 $\frac{1}{2}$ ounces and measured 6 $\frac{1}{2}$ inches in circumference.

Case No. 2. C.B. No. 2742, May 13, 1914. Calculus No. 1. Bay gelding, twelve years old, weight 1050. Condition fair. Owner sent animal to hospital. Seemed very much depressed, not eating very well. History indicated urinary disturbance. Rectal examination revealed a large calculus. This was removed with same precautions as No. 1 but with considerable difficulty owing to the irregular shape of the calculus. The same care was given the patient but death occurred on the fourth day, and post-mortem examination revealed extensive suppurative nephritis involving both kidneys. The calculus weighed 8 ounces, and measured 6 $\frac{1}{2}$ inches in circumference.

Case No. 3. C.B. No 1762, February 18, 1913. Calculus No. 2. Light Brown gelding, thirteen years old. Condition good. Owner sent animal to hospital after noticing irregular urination and hematuria. A large calculus estimated to be as large as a baseball was diagnosed. This was removed on the second day with less trouble than in case No. 2.

The wound was not sutured. Micturition, at first quite frequent, soon became regular and healing occurred with slight excess granulation. This was removed and the patient discharged in one week. This calculus weighed $12\frac{1}{2}$ ounces and smallest circumference was $8\frac{1}{4}$ inches.

Cases Nos. 4 and 5 were operated on without incident, both being removed through the incision as first made without effort. No. 4 weighed 3 ounces and No. 5 $4\frac{1}{2}$ ounces. Recovery was prompt.

Case No. 6. French poodle, female, age four years, weight ten pounds. Condition good. Owner presented animal at the hospital. History indicated a gradually increasing urinary disturbance for six months past. The animal was observed to frequently pass small amounts of urine. Palpation of the abdominal wall revealed an enlargement in the region of the bladder. A metal catheter was passed and tapped against the calculus thus indicating its character.

Under complete anæsthesia it was removed through an incision in the median line just anterior to the pelvis and a longitudinal one through the bladder wall. This latter incision was closed with one row of continuous sutures and over this Lembert sutures. Recovery was prompt and the patient discharged in one week.

This calculus weighed $1\frac{3}{4}$ ounces and measured about $3\frac{1}{2}$ inches in diameter. It was almost spherical. The surface was rough.—*Veterinary Alumni Quarterly, Ohio State University.*

*ON CERTAIN RELATIONS OF THE LOWER ANIMALS TO HUMAN DISEASE.

By DAVID JOHN DAVIS,

Chicago Ill.

"THE study of comparative pathology, it would seem, should occupy a more prominent place in the curricula of our universities and medical schools than it has in the past. When we consider the fundamental character of the studies in this field of pathology—the work of Jenner, of Pasteur, of Koch, of Theobald Smith and especially of a great group of investigators

*Read at the Quarter-Centennial of the University of Chicago, Departmental Conference in Pathology, June 6, 1916. Abst. from "Science," Vol. XLIV., No. 1132, Sept. 8, 1916, pp. 337.

in recent years on cancer and on tropical diseases in man and animals—the truth seems evident that in the study of disease and in its presentation to students, such an important field should not be slighted. Our study of disease in medical and veterinary institutions should be at least as broad and as comparative as is the study of zoology or botany. In order to understand the natural history of many diseases comparative studies are absolutely necessary. It would undoubtedly be advantageous both from a human as well as from a scientific standpoint if our medical schools and hospitals, our veterinary hospitals and even our cat and dog hospitals and other places for the care of sick animals could all be concentrated in one institution for the broad study of disease. This indeed is now being attempted in certain institutions and no doubt will result in a broader conception of pathology.”

Modes of transmission are summarized as follows:—

“I. Infection in man may occur through simple contact with diseased animals.

“II. The infectious agent may be carried mechanically from person to person or from animal to person through food or otherwise by a second animal.

“III. The animal may, through a bite, produce a lesion into which the infectious agent is transferred, as in rabies and especially in the blood-sucking insect diseases.

“IV. The parasite may be transmitted to man through the meat of lower animals used as food.

“V. The infectious agent may be transmitted to man through the secretions of the lower animals.

“VI. The infectious agent may enter one of the lower animals in which it passes through a regular phase or completes a cycle and then, usually through a bite of the animal, is transmitted to man.”

HUMAN DISEASES CARRIED.

1. By the dog: Rabies, foot-and-mouth disease, helminthiasis, flukes, tapeworms (especially *Taenia echinococcus*), infantile splenomegaly (from dogs through fleas), trypanosomiasis (*T. gambiense*), mange, fleas and ticks, ringworm, favus.

2. By the cow: Tuberculosis, actinomycosis, anthrax, cow-pox, tetanus (through vaccine), foot-and-mouth disease, septic

sore throat, rabies, pus infections, tenia saginata, milk sickness, paratyphoid fever.

3. By the horse: Glanders, rabies, tetanus, sporotrichosis, anaphylaxis, serum disease, odor of horses.

4. By swine: Trichiniasis, tuberculosis, anthrax, cestodes (especially *T. solium*), trematodes.

5. By sheep: Anthrax, tuberculosis.

6. By goats: Malta fever, tuberculosis.

7. By the antelope: Sleeping sickness.

8. By the cat: Rabies, cestodes, trematodes, favus, ring-worm.

9. By rats: Rat bite fever, bubonic plague (through fleas), trichiniasis (through hog to man).

10. By ground squirrels: Bubonic plague.

11. By birds: Psittacosis (from parrot).

12. By fish: Tape worms.

13. By arthropods, chiefly insects: Mosquitoes: Yellow fever, Malaria fever, Dengue fever, Filariasis; Fleas: Bubonic plague, infantile splenomegaly; Ticks and mites: Rocky Mountain fever, relapsing fever (African), tick fever of Miana, Japanese flood fever; Lice: Typhus fever, relapsing fever (*Spirochaeta obermeieri*); Bed bugs: Kala azar; Flies: Sandfly fever, sleeping sickness (tse-tse fly), typhoid fever and other infections carried mechanically; Crustaceans (water flea): Guinea worm infection (dracunculosis); Oysters, clams, etc., typhoid fever; Snails; Trematode infections (especially bilharziosis).

The control of diseases transmissible from the lower forms of life to man must include a careful consideration of the following points:—

"1. A lower animal may be the only agency in the spread of a disease.

"2. Several different species of lower animals may be concerned in the transmission of the disease.

"3. The lower animal may be a 'healthy' carrier. That is, the infectious agent though perhaps highly virulent to man may not cause the animal to become sick.

"4. The lower animal may be a diseased 'carrier'; that is, the infectious agent may cause the lower animal to become sick."

Reichel.—*Journal American Veterinary Medical Association*.

Abstracts.

*DISEASE SET UP IN VARIOUS ANIMALS BY *T. brucei*,
Zululand Strain.

Horse.—The Commission had no opportunity of studying this strain in the horse, but Mr. Shilston states that one horse inoculated by him at Pietermaritzburg died in 35 days with typical symptoms of Nagana.

Ox.—Six oxen were inoculated, but only two of these at any time showed trypanosomes in their blood. One of these died after 310 days, while the other is still alive at the end of a year. This animal has evidently recovered, as it appears sleek and healthy. The action of the Zululand strain is therefore the same as that of the trypanosome causing disease in man in Nyasaland; neither of them show any marked power of producing serious disease in cattle.

Goat.—Seven goats were inoculated with this strain. Four died, on an average, in 77.2 days (45 to 116). The remaining three proved refractory. No œdema of face or corneal opacity was noted in any of the goats. The Zululand strain seems to have less action on goats than the Nyasaland trypanosome, but the number of experiments is small. In the latter the duration of the disease was 41.8 days (19 to 72).

Sheep.—No experiments were made with these animals in Nyasaland, as it was found impossible to procure them from the natives.

Monkey.—Eight monkeys died, on an average, in 29.2 days (8 to 65). The trypanosomes were always present in the blood, sometimes in enormous numbers. In no case was œdema of the face or corneal opacity noted. After death enlargement of the spleen and liver, gelatinous infiltration at the base of the heart, and hæmorrhages in the epicardium were found.

Dog.—Seventeen dogs were inoculated. All died, on an average, in 18.5 days (12 to 26). In eight dogs blindness caused by opacity of the cornea was a prominent symptom, and in two swellings of the limbs were observed.

*Extract from paper by D. Bruce, A. Hamerton, D. Watson and Lady Bruce, in the "Journal of the R.A.M.C."

Rabbit.—As only two rabbits were available at Kasu, six experiments reported by Mr. Shilston are added. Eight rabbits died on an average, in 32.7 days (27 to 39). The course of the disease in the Kasu rabbits was the same as that described in a former paper¹ as being typical of Nagana.

Guinea-pig.—This animal is less affected by the disease than the rabbit. Ten were used; all took the disease and died, but four required to be inoculated more than once. They died, on an average, in 43.7 days (15 to 89). No prominent symptoms, such as are seen in the rabbit, occur in the guinea-pig.

Rat.—Twenty-three were inoculated and died, on an average, in 27 days (10 to 58), with their blood swarming with trypanosomes and their spleens enormously enlarged.

CONCLUSION.

The pathogenic action of *T. brucei*, Zululand strain, 1913, on various animals is so similar, not only in regard to the symptoms during life but also in the post-mortem appearances and rate of mortality, to that of the trypanosome causing disease in man in Nyasaland, that it affords another proof that these two trypanosomes are identical.

TO RAISE A FALLEN HORSE WITH A ROPE.

By A. C. WIGHT.

AT the recent Detroit meeting of the A.V.M.A., in the discussion among a number of veterinarians, there was much interest expressed in a method which I have devised for raising a horse from the recumbent position without the use of a sling, but with only the rope to be found in any barn or on any farm. This method may have been used and described by others, but I am unaware of the fact, so I thought that the profession might be interested in the method.

The only articles required are a block and tackle of sufficient strength to raise the horse, and thirty feet or more of rope, one-half inch or more in thickness. These items can be easily procured anywhere. The block is fastened to the ceiling or any other place above the horse in the usual manner.

The rope is handled as follows, first being doubled:—

1. Pass the doubled end of the rope over the head backward to where the collar rests on the neck.
2. Pass free ends of the rope between the front legs, crossing at once, just before it goes between the legs.
3. Pass lower rope under body, so that it emerges just posterior to the withers.
4. Lay upper rope over thorax, so as to cross lower rope at this point.
5. Bring lower rope over body and between hind legs.
6. Pass upper rope under body in a position to correspond to the other rope, bringing it back between the hind legs. Cross the ropes at this point.
7. Bring both ropes up over buttocks, one on each side of the tail.
8. Pass forward along the spinal column under the ropes where they cross on the back, and tie to point where the rope lies on the top of the neck.
9. Insert hook of block at point where the ropes passing over the back cross, being careful to engage all the ropes at this point, namely, the single strands crossing to go between the hind limbs and the double strand coming from each side of the tail to the neck.

All ropes should be drawn as tightly as possible before the knot is tied, so that all slack is taken up.

This sling is very easily applied (one man can do it at a pinch) and the horse in his struggles cannot fall out of it. The body is always right side up, neither end higher than the other, and the feet are always in a position so that they can be utilized to the best advantage. Contrary to this, a sling is hard to apply, it requiring considerable strength to pass a canvas under a horse; the accessory harness cannot be easily adjusted; in the process of raising, the horse will lunge and fall out or turn on his side; and, furthermore, as is not the case with the rope sling, the broad belly-band of canvas so constricts the thorax that in case the horse does not at once attempt to use his legs, he must be let down for fear of suffocation. This fear of suffocation is one objection to the use of the chain block, which is slow in its action, whereas with

the rope sling, this feature can be disregarded, as the ropes do not constrict the lungs sufficiently to produce suffocation. I had one horse which hung for forty minutes before he decided to stand up, without appreciable discomfort to the respiration.

Once the practitioner tries his method, he will nevermore use his sling for this procedure, but will raise the horse in half the time, and with a minimum of discomfort, both to the horse and to himself.—*American Journal of V.M.*

BILE AND URAEMIC POISONING IN A MARE DUE TO LARVAE OF GASTROPHILUS EQUI.

By H. P. BONNIKSON, Ferndale, Calif.

A SEVEN-year-old Percheron mare, weighing 1,500 lbs., in fine condition, had been used at light farm work, and was nursing a two-months-old colt.

May 24th she was worked for a few hours on a harrow, when the owner noted considerable depression and weakness.

May 25th she was turned at pasture and was found in a comatose condition during the forenoon. About noon she regained her feet and staggered about the pasture indifferent to the colt.

May 26th. Symptoms, 10 a.m. The most prominent symptom was vertigo bordering on unconsciousness and convulsions. She would regain her feet and stagger about with head near the ground; occasionally the head was struck with the fore-feet, and finally she would fall prostrate on her side, or backwards, striking the head heavily on the ground, and developed severe convulsions. This occurred repeatedly, the patient becoming 'bathed in perspiration, and blood gushing freely from both nostrils. Sensibility was greatly increased, even to the extent that the insertion of a thermometer would throw her into convulsions. After considerable time and hard labour the mare was tied down securely to prevent her from killing herself, as well as the colt. Attempts were made to quiet her with narcotics (Three H.M.C. tablets; formula B—Abbott), Cannabis Indica per jugular vein (10 c.c.), without

results. The convulsions increased in severity. P. 96, weak. R. 54, Cheyne-Stokes. T. 102.2. Marked congestion of conjunctival, m.m., pupils dilated. Lips and nostrils swollen; Mucous membranes of oral and nasal cavities darkly congested, having a tinge of green; tongue thickly coated and dark-green in colour. Death in general convulsions at 4.30 p.m. No diagnosis.

Autopsy.—On opening the abdomen, the mesentery, omentum, and all abdominal organs were very icteric. The liver and hepatic duct were distended with bile, bile capillaries and liver engorged with bile, plainly seen on the surface, and on cut section. Kidneys enlarged. Intestines darkly congested, probably due to blocking of the portal system. Icteric discolouration of the pericardium. About five inches from the pylorus of the stomach the duodenum was enlarged about the size of two fists. When cut open the enlargement was found to be a mass of Larvae of *Gastrophilus Equi*, or horse bots. In the orifice of the bile-duct where it opens into the duodenal ampulla was found lodged a large bot, which evidently caused complete blocking of the duct. In the stomach were also found many bots attached to the mucosa.

Conclusions.—The cause of the attack was mechanical: namely, the mass of bots in the duodenum, and the single one in the bile duct. Blocking the duct caused absorption, and hepatogenous icterus. The early symptoms of indifference, general depression, stupor, somnolence, coma, staggering gait, etc., were due to the narcotic effect of absorbed bile. The later symptoms of increased pulse, respiration and temperature, increased sensibility, vertigo, convulsions, unconsciousness, etc., were due to derangement of the kidneys, producing acute uremia, which affected the central nervous system.

Cornell Veterinarian.

Translation.

PARASITOLOGY.

RESEARCH ON THE EVOLUTION OF *HYPODERMA BOVIS* AND METHOD OF DESTROYING IT.

By A. LUCET.

WARBLES in cattle are due to the development in their system of the larvæ of two diptera: *hypoderma bovis* and *hypoderma lineatum*. These pests cause an annual loss in France alone of ten million francs to agriculture and the tanneries. Affected subjects present in the spring, on the back and loins, subcutaneous nodular swellings each enclosing a larva and allowing to escape, by an opening in the skin which covers them, an abundant sero-purulent liquid. The losses occasioned by this parasite are due to the hindrance it causes to growth, fattening, and the production of milk, to the depreciation of the carcase as flesh, and to perforations which considerably reduce the qualities of the skins. The author publishes the result of researches undertaken since 1912 at the laboratory of comparative pathology of the Museum of the Academie des Sciences, under the auspices of the Minister of Agriculture. *Hypoderma bovis* has been the only species studied. In the climate prevailing in and around Paris, the larvæ of *hypoderma bovis* leave the cattle that they infest in May, June and July, but, above all in May and June, and particularly in the morning. Ninety-five per cent. of the larvæ which have migrated from the subjects attacked transform themselves into pupæ in from 24 to 36 hours if one places them on the soil or in the laboratory on wadding, grass, or earth. Any modification applied to natural migration or to the conditions cited results in failure.

Their passage to the pupal stage is brought about on the surface of the soil, contrary to the assertion of German authors. Nymphosis had a duration of from 30 to 35 days on an average. During their existence the hypodermæ have as their enemies little rodents, the birds, and the insects of which a certain number eat the adults, their larvæ and their pupæ. The spores of different inferior fungi spread over the soil can penetrate their chitinous coverings, vegetate on their chrysalides and kill them.

Breeding in the laboratory at ordinary temperatures appears to give the best results, for it suppresses the causes of

destruction arising on the soil. Hatching takes place at all hours of the day, and not, as asserted by the Germans, only in the morning. The hypoderma breaks its enveloping membrane at the level of the neck, frees itself by to and fro movements, and is ready to fly in a few minutes.

In the fly stage the *hypoderma bovis* is only met with from the middle of June to the commencement of September. The average duration of life observed has been from 4 to 5 days. Although these experiences have been made at a cold and damp period of the year one can affirm that this diptera only lives the length of time necessary for pairing and laying; its buccal apparatus is rudimentary, and it does not seem to eat. It flies when the weather is warm, in rain it remains quiescent, and from its hatching to its death does not leave the place it adopts. Its flight is short; there is reason to believe that it wanders little from the places where it is born. The female encloses in her abdomen a considerable number of eggs (343 to 372). These eggs are deposited on the surface of the skin and on the hairs of cattle, and not in the depths of the integument.

Neither pairing nor laying can be observed, but the anatomical structure of the oviscapt is composed of chitinous elements united by a supple membrane enabling its segments to telescope.

Although Glaeser affirms that the panic of cattle is attributable to this insect, the author has seen a heifer live for several days in a cage *ad hoc* with seven of these diptera without ever showing any disquietude.

The eggs, white, ellipsoid, little compressed and of a length of about 1 to 15 millimetres, are prolonged at one of their extremities by a jointed stalk, terminated by a two-lobed appendix in the form of gutter, with the aid of which they are probably fixed at the moment of being laid.

German methods of destroying the larvæ appear to be illusory, troublesome and complicated. As a result of experiment on the larvæ of 81 nodosities, it was found that the injections of a few minims of pure or diluted tincture of iodine into the swellings killed the larvæ and caused their complete absorption. The death of the larvæ in the lesions was not harmful, and their absorption was possible without any subsequent suppuration.—*Revue Générale de Médecine Vétérinaire*.

G.M.

Correspondence.

PARACENTESIS ABDOMINIS

To the Editor of THE VETERINARY JOURNAL.

SIR,—In replying to your correspondent, "Old Practitioner," I beg to state that the operation of Paracentesis Abdominis is not, in my experience, done as often as it should be.

I have come to this conclusion as a result of an extended enquiry. I did not mean that the operation would cure torsion of the intestine. What I meant to convey was that for it to be of any benefit it should be done early in the attack. If a twist has taken place tapping is of no use.

I did not go to sleep until after I had tapped the mare. I only mention the sleeping because it was the means of demonstrating beyond a doubt that the canula can be left in a whole night without risk. The case I named was the first on record, showing the length of time the canula could be allowed to remain.

The animals do not knock about the box after being operated on, that is, if punctured in the right place, and in my opinion the place is that portion of the flank immediately over the pelvic flexure of the colon.

I can quite understand their knocking about the box after being punctured on both sides, and repeatedly. No wonder "Old Practitioner" has seen hundreds die. One case I mentioned I punctured the abdomen a few minutes before 8 p.m. I removed the canula at 10.30 a.m. the following morning. The mare kept perfectly still the whole night, and recovered. This was some years ago. I see her frequently; she works in the Tramway water cart. As to the tape being the limit, what is the harm in using it? In the old canulas used in cattle practice, at the cup shape extremity there was a slit made for the passage of the tape to maintain the canula in position. The canula can be allowed to remain in position at convenience. If for a cow, why not for a horse? Should the canula fall out the tape easily indicates its position in the bedding, otherwise it would probably be lost, it need not be. I have never seen the bowel torn. How am I to see it? I have searched at times, post-mortem, and failed to find the puncture in the intestine with any degree of certainty.

What is meant by the canula rocking about all over the place? What place? There is very little, if any, injury done, and the intestines will stand more than we think. See paper in December VETERINARY JOURNAL on Sand Colic in France.

The atmosphere of the place might enter the bowel and possibly do harm. What proof is there of this? The gas from the intestines being warmer than the outside expands according to the law of gases, and heat prevents the cold air from passing in. An abscess may follow a perfectly clean instrument, one placed in hot water prior to its use. This is not frequent. The horse in the case I mentioned was a farm horse at grass, so it should have as much ozone as it wanted in the month of July.

It is best, in my opinion, to open all abscesses when pointing or ripe. I see no objection in the expression, and if done too soon it has to be repeated. There is no advantage in this. How many colts have a "strangle" abscess, for instance, which opens of itself when ripe. As regards the two mares which were not treated, and which would possibly have recovered had they been "tapped" early enough, they were dying when seen. The operation was of no use.

"Old Practitioner" says he holds no brief for the farrier. He need not. I will. He is a very useful man indeed, and one who has used his observation to good effect. I meant no disparagement.

Now as to the "Colic" drinks, the idea is principally as a stimulant. Anodyne medicine for colic is unsatisfactory. I have found the draught convenient in use, and beneficial in effect, as far as I can judge. I have given and caused to be given a good many, but how it goes to work after the animal has swallowed it I cannot say. I am often asked by my clients to send a dozen colic drinks for their own convenience and to save time, and as far as I can see their use gives satisfaction, and owners of horses please me when they are used instead of others. Their monetary value is very useful when I receive it. Amongst other reasons why I became a veterinary surgeon, the chief was I wanted to earn a living. I have done so.

My drinks do not belong to the Cure-All-Class. I gave the formula, so they are not empiric.

In treatment one always treats symptoms as they arise. How are you to give the disease a name without symptoms?

Medicine is an art, not a science.

I have pleasure in replying to "Old Practitioner," and wish to thank him for his criticism.

Yours faithfully,

Plymouth,

P. G. BOND.

Notice.

THE "INALTER" VIAL FOR SERUMS.

THE Anglo-French Drug Company has done good service in bringing out a serum which does not deteriorate with keeping, and can always be quickly prepared ready for use. The Antistreptococcic serum, a sample of which we have received, is perhaps the most useful one for the veterinary practitioner. Conditions are almost constantly arising in our patients where the injection of this serum will prove beneficial. To name a few diseased states where it may be employed we may mention endometritis, influenza, poll evil, pyæmia, septicæmia and strangles.

The advantage of the product is that the serum is dry and enclosed in a tube which dips into carbolised water, the whole being contained in a vial sealed by a rubber plug. When the contents are required for use, the tube containing one gramme of the serum is emptied into the carbolised water (9 c.c.), where it quickly dissolves, and is then ready for injection. When thus prepared the serum has full potency and activity.

The firm also supplies mallein, tuberculin, antitetanic, and polyvalent serum in the "Inalter Vial."

The various biological products furnished by the Anglo-French Drug Company are prepared under the immediate supervision of M. Merieux (late of the Pasteur Institute) by the most modern and approved processes, and are submitted to the inspection prescribed by French law before being put on the market. Every reliance can therefore be placed on them and to those who for a number of years have advocated the standardisation of sera they ought to be, combined with their other obvious advantages, quite a welcome addition to our therapeutic arsenal.

G.M.

Reviews.

Fleming's Practical Horse-Shoeing. Eleventh Edition, revised and edited by J. Macqueen, F.R.C.V.S., Professor at the Royal Veterinary College, London. Crown octavo—pp. vii.+132—figures in the text, 45; price 3s. net, postage 3d. Publishers: Baillière, Tindall and Cox, 8, Henrietta Street, London, W.C.

THIS little handbook, containing a knowledge of the essentials and application of the farriers' craft, has been brought well up to date by Prof. J. Macqueen. Originally written by the late Dr. Fleming as a manual of instruction for regimental farriers, it may be classed as a standard work on the subject, the usefulness of which is indicated by the fact that this is the eleventh edition from the press. It is written in simple language, and well arranged so that the reader may gain a gradual and complete grasp of the right way to go about the shoeing of horses. Commencing with a few pages on "The Importance of the Art of Horse-Shoeing," successive chapters deal with the Anatomy of the Horse's Foot, the Hoof, its Growth, Shoeing, Preparing the Hoof, the Shoe, Preplantar and Winter Shoeing, Shoeing for Defects in Limbs or Feet, Management of the Horse's Foot, Streets and Roads, Instruction of Farriers. The book does not deal with pathological shoeing. The illustrations are good and quite sufficient for the purpose. Reasonable and sensible advice is given on the old controversy as to whether the shoe must be fitted to the foot or the foot to the shoe. We wish that all horse-owners would take to heart the lines on the injury inflicted by over-heavy shoes. Commercialism and rule-of-thumbism swear by the dogma that every horse's shoes should last a month, and the farrier who doesn't play up to the fantastic idea suffers accordingly. It may be usefully remembered that the wall of the foot in good hoofs does not exceed three-eighths of an inch in thickness (it is often perceptibly thinner), hence a point that carries weight with reasonable people in cases where nails are occasionally wrongly driven. Those who know the price of fullered iron at present will be glad to read the views on the uselessness of the fullered shoe.

We think that useful chapters might have been added to

the work bearing more particularly on cart-horse shoeing, and the use of pads, but it must be remembered that the manual is written primarily as a book of instruction for Army farriers, and it always seems to be presumed (we are inclined to think not always correctly, at any rate nowadays) that there is no use for heavy horses in the army, and consequently no need for printed matter on the subject. At a time when would-be farriers are increasing, perhaps faster than ever before, the importance of this book is self-evident, and another edition should soon be called for. The volume is one of the handiest and best we have as a guide to horse-shoeing, and although written for the farrier, is very valuable to veterinary students, farmers and horse-owners (who have open minds on the subject of horse-shoeing), and the veterinary surgeon himself may read it with pleasure and profit.

G.M.

Lameness of the Horse. By J. V. Lacroix, D.V.S., Professor of Surgery, the Kansas City Veterinary College, Author of "Animal Castration"—illustrated. Published by the "American Journal of Veterinary Medicine," Chicago, 1916.

A GOOD knowledge of how to detect and treat lameness in the horse is of primary importance to the veterinary surgeon, and here we have a book that has hardly been excelled as an instructor on the subject. The plan of the work is admirable, the matter is comprehensive, and the author possesses in a high degree fine qualities of exposition and lucidity. We think we have never read a finer chapter than the one on "Diagnostic Principles," in regard to the discovery of lameness and its seat, in any book on the subject, and throughout the volume the same high standard of thoroughness and broad vision are shown. If some of us find out the seat of lameness quicker than others, yet he who follows Dr. Lacroix's principles will not err by superficiality, and will take the best measures to come to a right conclusion.

No diffuse verbiage mars the description of the various lamenesses mentioned in the book, their anatomy, etiology, symptoms and treatment. The two main sections of lameness are those of the fore and hind limbs, and no scant survey is taken of the field covered. The illustrations in the book

are numerous and adequate. There are one or two fresh methods of treating lameness considered, notably those dealing with Dr. Cochran's method of shoeing horses with laminitis, and the manner in which Joseph Hughes, M.R.C.V.S., deals with quittor.

Opinions may differ as to the treatment to be adopted in cases of lameness or injuries, but few can find fault with the author's conclusions as to procedure—just one or two matters seem, however, to call for comment as the result of our experience. We think that where there is effusion of liquid in front of the knee in carpalis that opening the hygroma is good practice, and far more safe than opening the swelling in the case of capped hocks. We have had far better results in unnering in case of ringbone lameness than in that of chronic laminitis, and indeed results are likely to be so disastrous in the latter case that we never advise it. The treatment of open joint is a valuable addition to the literature on the subject, and we are glad to see an extract from Mr. J. N. Frost's article given. We think, however, that the benefit of continuous irrigation of open joints at intervals with cold water ought to be accentuated in cases where it can be managed. We have confidence in recommending this volume to all veterinary surgeons who desire to extend their knowledge of lameness, its diagnosis and treatment. After they have read it they will be in a better position to deal with the events of practice. It is a work that will appeal to the specialist no less than to the general practitioner.

G.M.

Annual Report on the Civil Veterinary Department, United Provinces, 1916. Printed at Allahabad by the Supdt. Gov. Press, United Provinces.

MR. E. W. OLIVER, M.R.C.V.S., F.Z.S., sends us the Annual Report of the Department, prepared by him, and the Government review thereon. The Honourable Mr. A. W. Pim, Secretary to the Government, commends Mr. Oliver for his contagious energy and the efficient control and activity exercised by him, and throughout the Report there is evidence that great strenuousness and advance have been prevalent in many of the operations undertaken by the chief and his staff. The deaths from contagious diseases have decreased during

the year by nearly two-thirds from the figure of the preceding year. Rinderpest has shown the greatest reduction.

The veterinary hospitals and dispensaries have been increased from 61 to 77, and the stud bulls and buffaloes from 116 to 145. Breeding on more scientific lines is taking place, and being stimulated by the giving of local awards of substantial prizes to the best specimens of young stock. The breeding farms for cattle, of which there are two, have done good work, and Shorthorn and Ayrshire bulls and cows have been imported with the idea of building up a strain of cattle that will stand the Indian climate, and give a permanently increased milk yield. There were 65 stallions belonging to the department operating in various districts, and most of them retained their high standard and repute as foal getters.

The veterinary strength of the subordinate establishments would have been increased by 60 or 70 assistants, but for the outbreak of war. The provincial staffs have worked very hard, especially in undertaking, often at short notice, inoculations and investigations. Mr. C. W. Wilson, M.R.C.V.S., is specially commended for the help he has given to his chief. An all-round advance has been shown in every phase of the Department's work and the ground-work has been laid, and the reins grasped for further gratifying progress in animal protection, therapy and improvement.

G.M.

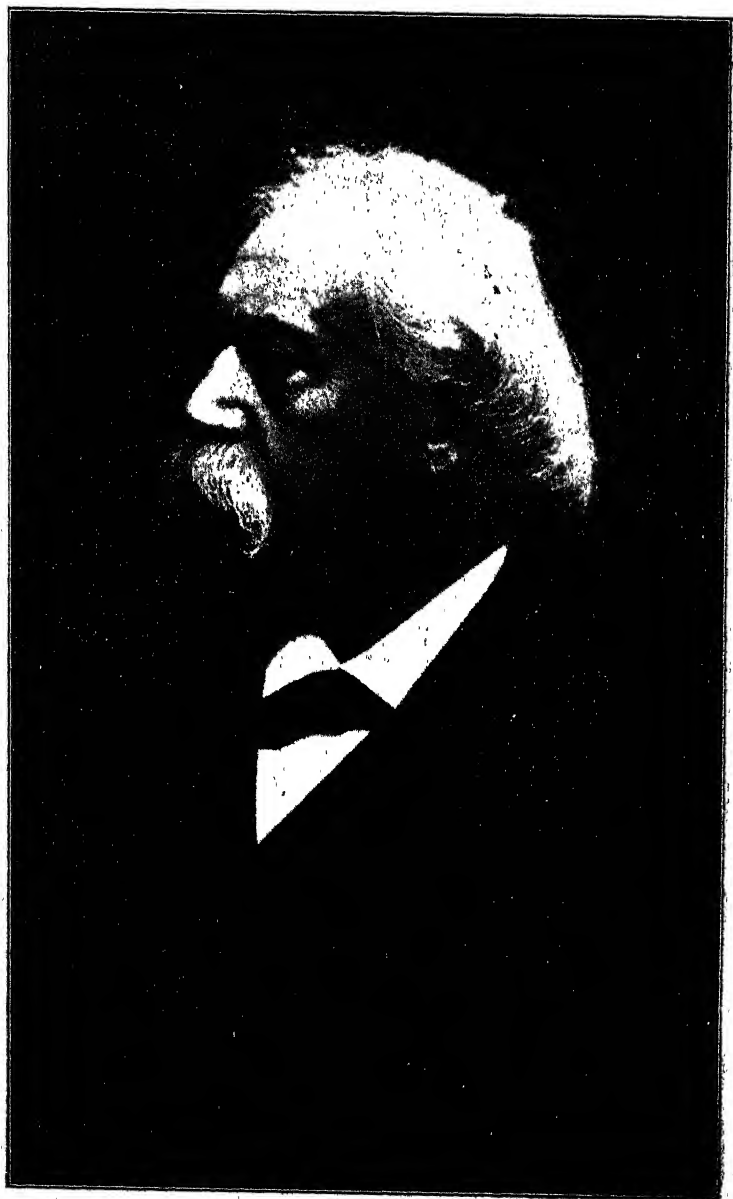
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PROFESSOR CHAUVEAU.

INSPECTOR GENERAL OF THE FRENCH VETERINARY SERVICE AND
FORMERLY PROFESSOR IN THE VETERINARY SCHOOL AT LYONS.

THE
VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING;
MAJOR IN THE ARMY VETERINARY CORPS, AND FORMERLY PROFESSOR IN
THE ROYAL VETERINARY COLLEGE, LONDON.

FEBRUARY, 1917.

PROFESSOR CHAUVEAU.

THE death of Professor Chauveau has removed from the veterinary profession of the whole world a wonderful man, and one who, although in his 90th year, had still opinions which were listened to with respect.

Born in 1827, he graduated from the Alfort School, and at the same time became a member of the Faculty of Medicine of Paris, being elected on the staff of the Lyons Veterinary School almost immediately, and as Director of the School in 1875. He was a member of the Institute at the Academy of Sciences, the Society of Biology, and a regular attendant at the meetings of the French Academy of Medicine.

In the veterinary world of France he was appointed Inspector-General of the Veterinary Sciences, and his work on the subjects of physiology and pathology gained him the Professorship of Comparative Pathology at the National Museum of Paris, where he eventually built an institute devoted entirely to the study of comparative work.

Chauveau was one of the original founders of the "Journal de Physiologie et de Pathologie Général," and the author of many valuable works, of which his "Comparative Anatomy" will be the most familiar to the British.

In the physiological study of the living heart he made standard researches in conjunction with M. Morey, and much valuable knowledge was given to the world through the methods they devised.

His whole life was one of the greatest energy, and the results of his valuable researches did much to elucidate many valuable points about which there had been doubt. The pity of it is that such men must die. His work, however, can never be forgotten, as it forms a platform upon which many edifices will in time be raised. He was indeed a giant in his generation.

Editorial.

THE HORSE BREEDING QUESTION.

It has been generally conceded that the horse stock of the United Kingdom is the finest in Europe, if not in the world. The brains and energy shown in bringing it up to its high pitch are apt to be forgotten by those living in present times, and there is a tendency to believe that the best equines exist here naturally, and will continue to arrive quite regularly, and methodically, without much effort on our part. What we fancy will come easily and as a matter of course we are liable to manage wastefully when it arrives. We frequently overlook the help that science can give to nature's part in production; the value its application may bring to the health and conservation of animal life; the guiding stars in hazy regions that its records will prove to be. The truth is, there has never been that thoroughness in the knowledge of horse breeding matters which there ought to have been in a land blessed as ours is with the best of foundation stock. Breeders can tell you how many mares their stallion jumped, and some of them can rattle off who was the sire and dam of many a high-born foal; but not one out of fifty can tell you how many live foals his stallion begat, or how those foals turned out as regards shape and constitution. Everything to the breeder is for the best in the best of all possible worlds, if his sire becomes a financial success; but finance in one corner of animal life only is but a foul spectre and an illusory shadow exerting a deleterious and unwholesome influence on the whole and complete field and aim of horse breeding. It is a crying omission on our part that records of deep knowledge and wisdom in reproductive operations do not exist in profusion in the archives of our land. We have had chances innumerable of collecting and collating the material, but we have been unworthy drones in the matter, and our record offices remain empty, dank, and musty. It is true that the Board of Agriculture have a return of percentage of foals for all horses having Government grants; but this, however valuable, only skims over the surface of things as affecting horse-breeding in its entirety.

We ought to know all about the best care and nourishment of the sire in the breeding season, and their influence on potency and the energy of the spermatozoa, the faults of nourishment and oestrus which hinder ovulation and make fruitfulness difficult, the number of mares a good stallion ought to make pregnant, and the number of living foals these pregnant mares ought to produce. A debatable point in the science of breeding is how soon after one jump a second

should be given. The influence of soil and surroundings on reproduction should be noted, and the number of male and female progeny produced be recorded. Some more light might be thrown on the causes of abortion in mares, and why with individual dams the foals almost invariably die during the act of parturition.

The light horse breeding question seems to be somewhat up in the air at present, but there ought to be no hesitancy or uncertainty about the increase of heavy horse production. We know the worst as to the inroads of motor vehicles on city and town practice. Motor tractors may decrease somewhat the number of horses on the farm: but it may be recollected by country practitioners for their comfort that the buying of a farm tractor does not lower the cost of working the holding, and it must produce increased returns to justify its existence. Again, in a country with much damp loam like ours, tractors are increasingly difficult to operate owing to the packing and clogging of the soil. The increased use of heavy horses for Army purposes ought to overbalance any decline in their employment due to motor farm implements.

In conclusion, we may state how very pleased we were to read a copy of a resolution recently passed by the N.W. Anglesey Shire Horse Society, and sent by them to the Shire Horse Society and other local societies. It is only a resolution that will cause a ripple on the placid surface of things, but it shows that the heart and head of the Anglesey Society are in the right place, and perhaps it will induce other societies to originate many deeper and more depth disturbing waves. This is the resolution:—

“That it would be a great advantage to Shire horse breeders generally, and to affiliated societies, if your Society would devise a scheme for obtaining a reliable return of mares served and foals produced each season by registered stallions hired out to various districts, and that a register of those returns be kept by the Secretary, so that every society or member might on application (on payment of a small fee) obtain the information required from him, and be in a position to judge of the foal-getting capacity of the horses.”

G. M.

OUR 500TH NUMBER.

WITH this number we complete our 500th issue, so that for over forty years we have given food for consideration and thought to the members of the veterinary profession. With the kind help of numerous contributors we have been able to keep the stream of veterinary science flowing merrily on. To those sending us contributions from the zones of military operations we are doubly thankful. Our gratitude is

especially due to all those who are rallying round us now. It was never more difficult to conduct a journal, from the editorial and publisher's points of view, than it is at the present time. We hope our contributors will continue to assist us by sending in case reports and items of interest of all kinds. We want the boys to have something profitable and instructive to read whilst on active service and when they come home, so that they may recognise that those of us too old or feeble to fight or campaign are doing what we can to keep the flag of veterinary science flying while they are helping to protect our homes and practices.

WE think it will interest our readers on this occasion to know the names of those who have acted as editors of the VETERINARY JOURNAL from its inception up to the present day.

The VETERINARY JOURNAL first made its appearance in 1875, under the editorship of George Fleming, C.B., LL.D., F.R.C.V.S., Veterinary Surgeon, 2nd Life Guards, who, it will be remembered, subsequently became Principal Veterinary Surgeon of the British Army with the rank of General. On his death, in 1894, he was succeeded by William Williams, F.R.C.V.S., F.R.S.E., Principal of the Royal Veterinary College, Edinburgh. In January, 1900, Professor Owen Williams, F.R.C.V.S., F.R.S.E., became sub-editor under his father, and when the latter died in November of the same year, his son took over the whole editorial responsibility. He subsequently moved to Liverpool, where he took an important share in founding the Veterinary Department at the University. In 1903, Colonel J. A. Nunn, C.B., D.S.O., F.R.C.V.S., F.R.S.E., Army Veterinary Department, joined him as sub-editor. When Owen Williams died in January, 1905, he was succeeded by Frederick Hobday, F.R.C.V.S., F.R.S.E. (now Major in the A.V.C.), who still edits the journal.

On the death of Colonel Nunn, in 1908, Professor G. H. Wooldridge, F.R.C.V.S., was appointed sub-editor, in which post he remained for several years.

In September, 1906, Mr. W. L. Williams, V.S., Professor of Surgery and Obstetrics in the New York State Veterinary College, joined the Editorial Staff as Editor for the United States. In January, 1910, Mr. J. A. Gilruth, M.R.C.V.S., F.R.S.E., Dean of the Veterinary Faculty, University of Melbourne, became Editor for Australasia, and Dr. Williams relinquished his post. In September, 1912, Professor Gilruth ceased to be on the Editorial Staff and the editorship of the Australian Supplement was undertaken by Professor H. A. Woodruff (now Major in the A.V.C.). In December, 1913, Professor Wooldridge resigned his position as Sub-editor, from which date Major Hobday has been in sole charge of the editorship of the journal. While on Active Service with the British Expeditionary Force in France, Major Hobday is being assisted in the editorship by Mr. Gladstone Mayall, M.R.C.V.S., of Bolton.

OUR readers will be glad to hear that among the names mentioned in Sir Douglas Haig's recent despatch that of our editor, Major F. T. G. Hobday, F.R.C.V.S., appears, in token of distinguished gallant and service and devotion to duty.

Clinical Cases : Army Veterinary Service.

AN INTERESTING CASE OF EVERSION OF THE UTERUS IN A COW, ACCOMPANIED BY MILK FEVER.

BY MAJOR FREDERICK HOBDAV AND CAPTAIN J. F. PLAYER.
Army Veterinary Corps

OWING to the absence of the veterinary surgeons of France on war duties, it is quite the usual thing for the British veterinary officer to be asked by the French farmer for assistance when it is needed, and by courtesy of those in high authority permission is given to render them help as far as lies in their power.

The French farmer is generally a very good fellow at heart, and will lend his tools or render assistance generally as far as lies in his power, so that for this alone he deserves a *quid pro quo*.

The patient on this occasion was a very nice Normandy cow, this being her fourth calf. The messenger who came for help stated that she was lying down on the ground, and appeared to be very ill and in great pain.

When we got there we found that the animal was only partly conscious. It was then about 11 o'clock p.m. She was very uneasy, and would not stand up for long at a time. The whole of the uterus and afterbirth attached was outside the vagina, and had become soiled on the cowbyre floor.

We both stripped for the job, and speedily obtained some hot water and disinfectant, washed the inverted uterus, removed the cleansing, and endeavoured to replace it. As she strained very violently, a tracheotomy tube was inserted, this causing an improvement at once.

Retroversion was eventually accomplished about 12.30 a.m., by which time she had again gone down, being quite unconscious, and showing all the symptoms of milk fever.

We obtained a clean, silver-plated teat siphon (most French farmers are educated to keep such things at hand), and with the aid of a bicycle pump the udder was inflated with air. Tapes were applied for half an hour to the teats, and the animal made comfortable for the night. This treatment was repeated twice, and the cow rapidly recovered consciousness, eventually making a most excellent recovery. A canvas and rope truss was put on, tapes also being inserted across the vulva, and these were removed on the second day afterwards.

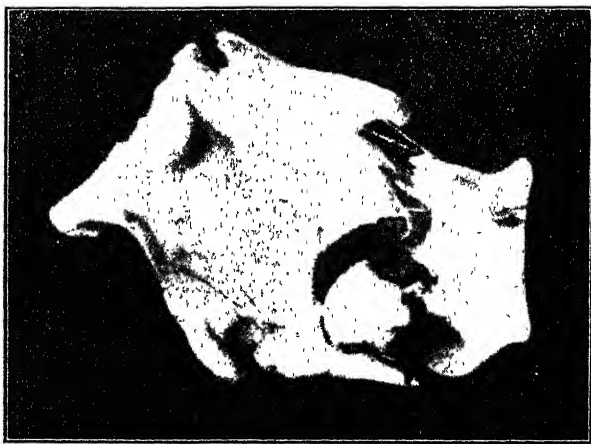
AN INTERESTING SHRAPNEL INJURY.

By LIEUTENANT J. A. MATHESON,
Army Veterinary Corps.

THE subject from which the photograph was taken was a bay gelding, heavy draught, evacuated to hospital with a shrapnel wound on the near side of the neck about the middle third.

There was considerable pain when the neck was manipulated, and also when attempting to feed off the ground.

Examination in the standing posture caused such pain that the animal was cast and chloroformed, after which a probe revealed that there was a foreign body there, and that the bone was fractured.



Photograph showing position of the Shrapnel Bullet.

With the finger a bullet could be felt firmly embedded in the bone, but all my efforts to remove it were unavailing, and the patient was destroyed.

Post-mortem examination revealed a shrapnel bullet which had become lodged in the body of the third cervical vertebra, and fractured it into several splinters. Had the patient recovered, anchylosis, and a consequent stiff neck must inevitably have been the result.

BACTERIAL NECROSIS IN THE HORSE.

By CAPTAIN E. F. STEEVENSON.
Army Veterinary Corps.

THE following are a few notes, which I made while in France during the latter part of 1914 (October to December) and in 1915, on the above disease in a large number of cases of which occurred in the horses under my veterinary charge.

The disease occurred as a Gangrenous Dermatitis affecting principally the heels, coronets, and frogs, and occasionally as necrosis affecting the tongues and gums of horses. It also occurs in other situations—*e.g.* above and around the fetlocks and even above the knees and hocks, and apparently it may occur anywhere. A few cases also occurred in mules, but this animal appears to be much more resistant to the disease, and I never saw a very severe case.

Causes.—The actual cause appears to be the Necrosis Bacillus (Schmoll's Bacillus), accompanied by other "accidental" organisms. In smear preparations of the pus obtained from lesions and sent to the London College by Capt. Beck, A.V.C., the Necrosis Bacillus was found in large numbers.

Contributing Causes.—Anything which tends to break the continuity of the skin appears to afford the necessary opportunity for the bacillus to establish itself in the tissues, and since the lower parts of the limbs are the most frequent seats of lesions, the following are some of the common causes: Abrasions, cracked heels, rope galls, abscesses at the coronet from suppurating corns or punctured feet, thrush (in frog cases), and injuries from kicks, treads, etc. In cases affecting the mouth and tongue the original injury is not always apparent, but, no doubt, occurs and may be caused by foreign bodies, irregular teeth, etc. Cold does not seem in itself to influence the occurrence of the disease, though it may lower the vitality of the parts, and so favour infection. Some of the worst cases, however, have occurred in summer.

Symptoms.—Usually the onset of the disease is sudden, and lameness is the first symptom noticed, varying from slight lameness to inability to use the affected limb. On examination, the skin over an area varying from the size of a sixpence to a five-shilling piece is hot and excessively painful, and in horses with white hairs and unpigmented skin, visibly congested, and deep red, or even purple, in colour. In white-haired legs, too, a sharp line of demarcation can usually be seen by the second day, outlining the necrotic area which is about to slough. Pressure on this area causes severe pain and the exudation of a little reddish-yellow fluid. At this stage the horse is always lame, and there is usually a bad odour, which is readily detected on the fingers after manipulating the spot. The hair is moist, and often a little pus containing shreds of necrotic tissue can be seen exuding from the edges of the lesion. The leg from the foot to the knee or hock is usually more or less swollen, and there may or may not be fever. In severe cases there is always fever, with acceleration of pulse and respirations. In from two to three days, or longer, according to the case, the piece of skin included within the outlined area sloughs, and with it a varying amount of the subjacent tissue, leaving a deep granulating sore with

ragged edges. In favourable cases lameness then disappears, and healing occurs by granulation. In unfavourable cases sloughing extends, and gangrene becomes more pronounced, and in such cases it is very difficult, and sometimes impossible, to arrest the extension of the necrosis and get the tissues to take on a healthy action. In these cases there is always a very putrid odour, and the whole region is intensely painful. If a part of a limb is affected, no weight is placed upon it unless the animal is forced to do so; but the limb is held in the air with certain spasmodic movements, much as in cases of acute anthritis, except that as a rule the animal *can* put some weight on the limb if forced to move. (In one case affecting the inside of the hock after a kick, necrosis spread both up and down the limb until it reached half-way up the tibia and half-way down the cannon bone; and on trying to remove the necrotic parts with the knife, the yellowish, putrid, insensitive dead tissue was found to extend right down to the hock joint and to include the perforans tendon where it passes through the tarsal sheath. The necrosis extended down to the bones of the hock and also the tibia. The whole skin surrounding the leg could be removed over a length of quite 18 inches.) The temperature varies from 101° F. to 104° F., or even higher; breathing is accelerated; and the pulse, at first fast and full, rather like a laminitis pulse, becomes faster and weaker. The mucous membranes are injected and dirty looking, and the animal is dull and refuses food. If the case does not improve, the animal rapidly becomes weaker, lies down a great deal, and has much difficulty in getting up, temperature rises still higher, and death occurs from toxæmia and exhaustion.

In cases affecting the sensitive frog the symptoms are similar, and a cone-shaped slough becomes detached from the plantar cushion. There is acute lameness; but these cases usually do well.

Complications.—These include open joints and tendon sheaths, loss of a hoof due to separation (caused by the discharge) of the horny from the sensitive laminae, quittor (which is a common complication in cases affecting the area over the lateral cartilages), oral fistula in mouth cases, exostoses of the os suffraginis and os corona in a few cases, gangrene and septicæmia.

Treatment.—Prophylaxis consists in careful drying of the heels and legs and strict attention to all wounds, cracked heels, rope galls, etc. Cracked heels should be frequently looked for, carefully dressed, and kept as dry as possible. An oily dressing or vaseline is most valuable to prevent penetration of the mud, in which the organism is abundant.

Curative Treatment.—In the early stages carefully clip the hair from the place and surrounding area and thoroughly cleanse the

region. Then apply a hot antiseptic fomentation—*e.g.* a hot bath of hydrarg. perchlor or carbolic acid, or antiseptic poultices. In cases affecting the coronet, poultices seem less liable to cause separation of the hoof than foot baths. A thick paste of kaoline (anti-phlogistine) applied hot is better still, if available. Applications of a 1-20 solution of potass. permanganate between the poultices or foot baths are very useful in removing the smell, and being an oxidising agent it is particularly indicated to combat an anærobic organism. It is necessary to cause separation of the necrotic skin and tissue as quickly as possible and as much as possible should be removed with scissors. As soon as sloughing has occurred, dress the wound with a 1-20 solution of permanganate or pure tincture of iodine, and after this the place may be treated as an open wound. Granulation should be controlled by pressure, and if necessary the use of a caustic. A double strength of "White Lotion"—*i.e.*, Lead Acetate ʒi Zinci Sulph. ʒiv to a pint of water—is very useful as an occasional dressing. In cases affecting the frog, free drainage is essential, and directly sloughing has occurred the part should be cleansed and kept as *dry* as possible. Where the lesion affects the coronet and there is swelling, it is necessary to thin the wall of the hoof, and perhaps remove a portion where the pus has burrowed under it. Pain is excessive in many cases unless the wall be thinned below the swollen area.

In cases where necrosis and sloughing continue, the actual cautery may be necessary (subcutaneous injections of hydrogen peroxide around the lesion would appear good treatment, but I had no opportunity to try it).

Complications must be treated according to the case; open joints and tendon sheaths are usually hopeless; and the continuance of fever after sloughing has occurred is a very bad sign, and indicates extension of the necrosis and gangrene.

Note.—It is a rather interesting fact that this disease has in my experience occurred just as frequently and severely in horses standing under cover in barns, etc., as in horses standing in the open and exposed to mud and cold. The disease is much commoner in winter, and especially during thaws after a frost. Several cases occurred in summer, and usually after rain. I have also seen four or five cases, one extremely severe (the horse had to be destroyed) in Mesopotamia. These latter occurred in February, 1916, during the heavy rain which fell there. The animals in which it occurred had *not* come from France, but were in a cavalry brigade which had been in the country many months.

EVERSION OF THE UTERUS IN A MARE.

BY CAPTAIN A. S. FERGUSON.

Army Veterinary Corps.

WHILST attached to a battery of artillery and stationed in a French village within a few miles of the firing line I was requested by the Commanding Officer to extend the "Entente cordiale" to a French farmer by going to see his mare, which was said to be very ill.

I found the mare to be a well-bred Percheron, 5 years old, which had foaled about 12 o'clock mid-day, and had everted her uterus.

I arrived there about 2 o'clock, and at this time the whole uterus was protruding, and the cleansing attached.

The mare was restless and would not allow her temperature to be taken, but after some manipulation I removed the afterbirth and bathed the swollen parts with hot water. I had no disinfectant, and could not procure any at the time. I then got a cloth, held by a man on either side, to support the organ, and attempted to effect a retroversion. After manipulating it for about half an hour I managed to successfully return it. A plough line was fashioned as a truss, and applied.

No medicines were administered, and no antiseptics used, and she was off her feed for two days, but except for a quickened pulse she showed no symptoms to give rise to alarm, and within a week had made a good recovery.

EXPERIENCE OF A VETERINARY OFFICER DURING THE BATTLE OF THE SOMME.

ABOUT 10.0 p.m. one night, during the heavy shelling after the men had gone over the parapet in the sector in which I was stationed, I was sitting in the ruined farm-house which had constituted our mess, when news was brought to me that the transport had been shelled badly when taking up rations, and that a number of the mules had been killed and others wounded. Owing to the difficulties of getting the wagons up to the trenches, all the ammunition and food was taken up on pack-saddles the mules being divided up into isolated parties.

The party to which I was called had caught it badly, and upon arrival I found that some twenty-seven of the mules had been more or less damaged. By the light of a torch I made a rapid inspection, and at once put four of the poor brutes out of their misery with my revolver. The remainder were eventually got out of the shelling area, and patched up the next morning.

It was a horrid sight to see the havoc which had been made, as some of them had huge flesh wounds, and in all cases the animals were absolutely terrified. They had stampeded when the shells dropped amongst them, and it was only with the utmost difficulty that they had been caught again.

Original Communications.

DIAZO-REACTION.

By G. GAIR, M.R.C.V.S.,
Cononbridge.

WITH reference to the interesting article by Mr. Mayall on the Diazo-Reaction in equine tuberculosis, several opportunities occurred to me lately whilst acting as bacteriologist for the M.O.H. and hospitals of the County of Ross-shire of using the Diazo-Reaction in cases of tuberculosis, typhoid, fever, and heart disease in the human subject.

In all the human cases of tuberculosis examined microscopically for T.B., and in which the bacilli were obtained in the sputum, the reaction was constantly present in the urine. The reaction is always evident in typhoid fever. A particular instance happened lately in a suspected typhoid case, where I only obtained a partial clumping with the Widal test. The urine reacted, however, very strongly in the Diazo reaction. This case appeared at first to be one of tuberculosis. Having, however, put some of the urine under the 1-6th objective, the bacilli of typhoid were obtained in great numbers.

I also grew it on agar and had a vigorous growth next day, and then plated the urine on Conradi-Drigalski medium and obtained a typical growth of the organism. To differentiate it from *B. Coli*, or para-typhoid group, it was put through the various sugars, which showed conclusively the nature of the disease.

From the outset this case continued a mild one; and as the Widal test is not decisive before the seventh day of fever, this may account for the result of the test exhibiting only partial clumping, along with the fact of this examination being made in the early days of the fever.

The Diazo-Reaction is obtained in the urine of typhoid patients three or four days earlier than with the Widal test. The bacilli are also found in the urine of typhoid patients at an earlier stage than that on which the Widal test can be satisfactorily applied.

The detection in the urine of human beings and animals of these pathological substances which give the Diazo-Reaction is of great clinical value in diagnosis, and especially in prognosis, in cases of tuberculosis and typhoid fever.

The diagnostic value is perhaps greater in typhoid fever than in tuberculosis: it occurs in a large percentage of typhoid fever as early as the fifth day, while its disappearance usually indicates subsidence of the disease; a reappearance suggests a relapse. The reaction does not appear in the para-typhoid group. Should the reaction be positive, the foam of the urine shows a beautiful pink colour, and the body of the urine a crimson. These colours should not be mistaken for a reddish-brown, which develops at times, and soon disappears when the tube is set aside. When the ammonia is added by letting it run down the sides of the tube containing the urine and reagent, one should note the rings of various colours at the point of contact.

The formation of a red ring is an indispensable part of the true Ehrlich Diazo-Reaction. The pink foam in positive cases varies in intensity, depending on the strength of the reaction, from palest rose to deepest pink, but must not be any other colour, such as orange or salmon.

A STUDY IN TOXICOLOGY.

POISONOUS VEGETABLE AGENTS—CATTLE, HORSES, ETC.

BY FRED. C. MAHON, M.R.C.V.S.

POISONS ENCOUNTERED MOSTLY IN COUNTRY PRACTICE.

The points about vegetable and mineral poisons are :—

- (1) That they all contain certain definite and specific actions ;
- (2) That they all lie latent in the system a certain, but varying period of time before these actions are set up ; and
- (3) That the phenomena resulting from their action vary in some degree according to the dose and to the receptivity of the patient.

The first law, or that of the definite and specific actions of poisons, cannot be doubted, for if it be supposed that agents acting on the human body do not produce their effects according to certain definite laws, we can neither determine the seat nor the cause of any disease, nor direct nor judge of the operation of remedies.

No one, for instance, has seen castor oil produce tetanus, or colchicum intoxicate the brain, or opium influence the spleen. The physician perfectly well knows that the first of these acts on the intestines, the second on the ligaments, and the third on the nervous system generally. The action of poisons, therefore, is not accidental, but determined by certain definite laws.

The action of poisons, though definite, is variously limited. Some poisons, for instance, act on one membrane, or one organ, or on one system of organs ; while other poisons extend their action over two or more membranes, or organs, or system of organs, or even over all the whole animal frame.

We have examples in aloes and jalap of substances that act mainly on the mucous membrane of the alimentary canal. In digitalis we have the instance of a medicine that principally acts on the heart, greatly reducing—or even stopping—its action, while strychnine is an example of a medicine, acting on the parts supplied by the spinal cord, producing painful and sometimes fatal tetanic action of every voluntary muscle of the body.

It is seldom, however, that the action of poisons is limited to one membrane, or organ, or system of organs. The greater number of these noxious agents more usually act on two or more membranes, or organs, or sets of organs. Elaterium, for instance, acts on the mucous membrane of the intestinal canal, and on the kidneys.

Tobacco nauseates the stomach, intoxicates the brain, and affects the action of the heart.

Antimony has an equally extensive range ; it includes cutaneous

perspiration, acts cathartically and emetically, and in large doses appears to cause gangrene of the lungs.

Alcohol and opium are examples of substances acting still more generally, affecting not only the action or secretion of every organ or tissue of the body, but even in some cases altering their structure. Thus alcohol, in its most limited action, has been shown to cause structural disease of the liver, of the stomach, and of the coats of the arteries. From the circumstance of these substances acting not only generally, but inducing local action, they resemble in their effects those of many morbid poisons, as that of typhus fever, of scarlet fever, of small-pox, or of syphilis.

The second law of poisons is that they lie latent in the system for a period of time, which varies in different individuals, before they set up their specific actions. Rhubarb, for instance, produces no immediate result, but lies dormant in the system for six or eight hours before its action is sensible on the bowels. Opium in the usual dose is generally thirty minutes before it subdues the brain. The convulsions of strychnine do not follow till twenty minutes after its administration; and perhaps every substance except hydrocyanic acid has a greater or less sensible period of latency.

When a medicine acts on more parts than one, a considerable space of time may elapse after it has affected one organ before it affects another. Thus digitalis frequently occasions emesis before it acts on the heart, and the action of mercury on the bowels is frequently sensible for many weeks before the gums and salivary glands are affected. The doctrine of the latency of poisons is indeed so generally admitted that the actual period has been a point on which the condemnation of a prisoner tried for manslaughter has turned in our Courts of Justice when certain poisons have been supposed to have been given.

The third great law of poisons is that their effects are modified by the dose, the temperament, and the existing state of the constitution, mentally and bodily, of the recipient. The effect of the dose in modifying the pathological phenomena of disease may be exemplified in the actions of *oxalic acid* and *arsenic*. The specific action of oxalic acid is to inflame the mucous membrane of the stomach, but to ensure this effect the dose must be limited, so that this poison may lie in the system for many hours. On the contrary, if the dose be excessive and rapidly absorbed, the poison so disorders all the functions of the three great nervous centres that life is destroyed in a few minutes.

Arsenic, likewise, is a poison which inflames and ulcerates the mucous membrane of the alimentary canal, but it requires some hours to set up its specific action, for when the dose is large it in like manner

destroys the general irritation, and traces of morbid change of structure cannot be appreciated after death. It follows from this law that the larger the dose, or the greater the intensity of the poison, the more rapid its action, and the less the probability of finding any trace of specific lesion induced by it. In the same manner the action of specific disease poisons is also limited, some affecting one membrane, or one organ, or one system of organs.

Morbid poisons have also their periods of latency, during which they seem to lie in the system before exercising their specific action. This period of incubation is indefinite in some diseases, while in others, such as rinderpest, it is definite, producing its specific action in even seven or eight days. In addition to its action upon a membrane or organ, or upon the whole body, a specific virus has, besides poisonous effects upon the blood, the power of causing certain physical alterations in that fluid.

Andral has found that a specific cause has a tendency to destroy or reduce the quantity of fibrin in the blood, and that this defect of fibrin is the cause of the great tendency to hæmorrhage, and to that stasis or congestion so remarkable in typhus fever, scarlatina, and other specific diseases.

The facts and arguments which have been adduced prove that morbid poisons act in all instances not capriciously, but according to certain definite and specific laws, modified by the influence of climate, temperament, or the magnitude of the dose; also, that they mingle with the blood, with which they continue in latent combination a certain but varying period of time, and likewise that many of them are capable of coexisting together in the same system.

A knowledge of these facts is necessary to the proper understanding of this class of diseases, and it is to be hoped that by their application many of the difficulties which have hitherto obscured the doctrines of fever, syphilis, of hydrophobia, and of many other diseases incident to this class of morbid poisons, may be removed, and that this portion of medical science may be placed on a surer foundation, if not on a permanent basis.

After reviewing the laws which govern poisons in general, I hope, as briefly as I can, to allude to some of the commonest forms of poisoning occurring in veterinary practices from my own rather large experience, and propose leaving out mineral poisons and devoting chief attention to vegetable poisons, which subject commonly occurs in the life of country practitioners, and affords much doubt and perplexity in so many cases of illness or death in which our services are requisitioned.

Lately I have had my attention drawn to a herd of cattle of

varying ages—from cows 5 and 6 years old, down to calves 6 months old—the chief symptoms presented being a dry cough, staring coat, loss of flesh, diarrhoea, constipation, haggard countenances. I was informed one calf had died, and that malicious administration of some agent had occurred.

After gathering all the information I could from the intelligent owner, I adopted what the late J. H. Steel, in his work on the Ox, lays down, and quote him on this occasion: “When called in to a case of supposed poisoning of animals out at pasture, the practitioner must set about the enquiry with an entirely unprejudiced mind. He will often find that the outbreak is one of an anthracoid nature, or other enzootic disease, not due to poison properly so-called.”

It is in a case of this kind that the scientific practitioner finds the value of a knowledge of botany. When called in to put a stop to some unusual fatality in a flock or herd, after duly recording the history of the outbreak, the symptoms, *post-mortem* appearances, and general treatment of the animals, he should direct his attention to the nature of the pasturage. Careful inspection of the field, or fields, is necessary, for the growth of some plants, sometimes in small spots, and even one individual plant may destroy a herd. The general and special nature of the flora must be examined, all known plants being duly noted, all unknown plants suspected and investigated. The hedges, trees, and substances around the field, and which are accessible to the occupant, must be observed, and the general character of the ground—as nature of the soil, elevation, irregularities, also the kinds of manure which have been used to it, must not escape notice.

In observing the *post-mortem* appearances, we must carefully examine the position of the animal, the state of *rigor mortis*; also the tendency to putrefactive changes in relation to the length of time which has existed since death. The conditions of the surface of the body as indicating an easy death, or the reverse, should be noted, and the markings of the animal for the purposes of identification. Notice particularly any smell arising from the ingesta. The stomach, intestines, and bladder should be put aside, and in a closed vessel, for chemical analysis; and also portions of the walls of the stomach, of bowels, and liver, as in these very often traces of poison will be found. The complexity of these processes generally renders the opinion of an expert desirable, if any importance is to be attached to the case. Be careful, also, to see in such cases none of the ingesta or viscera come within reach of pigs or dogs, especially on the farm or in stables.

I take it that the following are the chief narcotico-vegetable poisons encountered in Great Britain, and I have experienced such cases in

some districts more than others. As before remarked, some species exist but sparsely in some counties and in others are prolific.

1. *Digitalis* (Fox Glove). The root, leaves, and seeds are the most active parts; in improper doses it is a deadly poison, owing its activity to the powerfully bitter, poisonous alkaloid "*Digitaline*."
 2. *Adonis Autumnalis* (Pheasant's Eye). 3. *Delphinium* (Larkspur).
 4. Poppy. 5. *Hyoscyamus*. 6. *Bella Donna*. 7. *Solanum Dulcamara* (Woody Nightshade or Bittersweet). 8. Hellebore. 9. *Conium Maculatum* (Hemlock). 10. *Colchicum Autumnalis*. 11. Yew.
 12. Laburnum. 13. *Anemone Pulsatilla*. 14. *Mercurialis Annua*.
 15. *Mercurialis Perennis*. 16. *Ranunculi*. 17. Bryony. 18. *Rhododendron*. 19. *Veratrum Album*. 20. Hellebore Niger. 21. Hellebore *Fœtidus*. 22. *Cicuta Virosa* (Water Hemlock). 23. Acorns. 24. Ferns. 25. Oak Shoots.

These are the chief offending agents—or, at least, have been broadly considered so in my experience. There are, exclusive of these plants, the fungi, of which few, fortunately, are poisonous to cattle or other animals, and the Ergot of Rye ("*Claviceps Purpurea*").

Generally speaking, the chief poisonous plants one encounters in low-lying, marshy, and ill-drained land are the "*Poisonous Umbelliferae*," the toxic properties of which are due to the presence of a narcotic, acrid fluid, and seem to vary according to the nature of the soil and climate; for, as Dr. Christison has noticed, certain species which are generally regarded as poisonous are quite harmless when obtained from some localities near Edinburgh. This is a very important point, and one which requires further investigation. Should it prove to be true in all cases, it would probably account in a great degree for the varying strength of the official preparations of hemlock, which is commonly believed to arise from their careless preparation.

The chief umbelliferae I have seen fatal and detrimental results from are: (1) *Aenanthe Cynapium* ("*Fool's Parsley*") is a very common indigenous plant, possessing poisonous properties; the leaves have been mistaken very often for those of parsley. (2) *Aenanthe Crocata* (Hemlock, Drop-Wort) are extremely poisonous in most localities. The roots also of *Aenanthe Pimpinelloides*, as already noticed, are said to be wholesome.

All the above species are indigenous. *Cicuta Virosa* (Water Hemlock or Cowbane) is another indigenous plant of a highly poisonous nature. *Conium Maculatum*, a native of America, has very poisonous roots, which, from having been mistaken for other harmless umbelliferae, have not infrequently led to fatal results.

Next come in matter of urgency, although less commonly brought to our notice, rhododendron poisoning, attributable to ill-kept fences

and by cattle straying into parks and eating of same. I have recently encountered a severe outbreak of supposed malicious poisoning, but on careful examination and detection of the herd eating in the coverts where the plants were growing luxuriantly, together with a *post-mortem* examination on a 6 months old calf, where the leaves and young shoots were found in the rumen and abomasum in large quantity, pointed to this plant as being the cause of death from gastro enteritis. There are also cases (2) where indigestion, lassitude, debility, marasmus, diarrhoea, with irregular cardiac beat, sunken eyes, salivation, and low temperature were the most marked symptoms; and where olive oil, with nux vomica, iron, gentian, and aniseed powders, and electuaries of the same, housing, isolation, warmth, and occasional stimulants brought relief in five weeks, the calf, 8 months old, gradually gaining flesh, losing the haggard look, and bids fair to recover. Cases 3 and 4: 6 months old heifer and bull calf. These are but skin and bone, and were the last found in the rhododendron plantation, and showed primarily all the lesions met with in case (2). The properties and uses of the order "*Rhododendrea*" are chiefly remarkable for their astringent properties; others are narcotic, and in some cases even poisonous. Especially is this the case with (1) *Kalmia Trifolia*, (2) *Rhododendron Chrysanthemum*, (3) *Azalia Pontica*. The fruits, however, of many are edible. The species of *Erica*, *Rhododendron*, *Kalmia*, *Azalia*, etc., are largely cultivated in this country, on account of the beauty of their flowers.

(1) *Andromeda Floribunda*, a shrub of North America, is by all accounts a deadly poison. In 1866 a number of sheep were poisoned by eating of it, but nineteen out of thirty-seven recovered under judicious treatment.

(2) *Azalia Pontica* (Trebizond Honey) owes its poisonous properties to the bees feeding on the flowers of this plant. Xenophon mentions the poisonous nature of this honey in his account of the "Retreat of the 1,000."

(3) *Gualtheria Procumbens* (Partridge Berry): The leaves possess aromatic, astringent and stimulant properties, which they owe to a volatile oil and tannic acid. The oil is known by the name of Partridge Berry or Oil of Wintergreen, and is used as a local stimulant with success in rheumatism. This plant, however, has not proved injurious to cattle feeding on it.

Nextly, *Aconite* (*Aconitum Napellus*), Monkshood: The leaves and flowering tops of the plant, also the root, especially the latter, are poisonous. I once encountered two deaths from this plant, and in sheep; others suffered from dyspnoea, skin cold, clammy, blanching of mucous membranes, giddiness, staggering walk. These recovered

by dosing with whisky and strychnine sulphate hypodermically (1885).

Belladonna (Deadly Nightshade). I have only recognised toxic symptoms in a horse ; never definitely in cattle.

Then as to *Veratrum Album* (White Hellebore) : This is a narcotic, acrid poison, and is occasionally the cause of death in cattle.

The Yew order (*Taxacæ*). The common yew produces extremely durable and valuable timber. Its leaves and young branches act as narcotico-acrid poisons, both in the human subject and other animals ; but it would seem to be most injurious to horses and cows. It is also frequently said that animals may feed upon the young, growing shoots, and, left upon the ground for a short time, they are then poisonous. This notion is, however, altogether erroneous, for the shoots are poisonous in all conditions. We believe that the pulp surrounding the seed is harmless, but that the seed itself is poisonous. Yew leaves and seeds (berries) have been given medicinally for their emenagogue action, sedative, and anti-spasmodic effects. According to Doctor Taylor, yew tree tea is sometimes taken to produce abortion. In cattle I have encountered several cases where abortion in the cow could be referred to its being eaten of in large quantities.

Of the N. Order (*Ranunculacæ*) we have two irritant plants, eaten in quantity sufficient to produce toxic symptoms—viz., *Ranunculus Scleratus* and *Ranunculus Flammula*.

Arum Maculatum (Wake Robin, Cuckoo Pint, or Lords and Ladies), a common plant, and the source of the so-called Portland Sage or Arrowroot. Formerly the tubers were used medicinally as diuretics and expectorants ; when fresh they act as irritant poisons. (Cattle and Horses.)

Conium Maculatum (Hemlock).—This plant is indigenous ; it has been for a long time official in the Pharmacopeia, but in proper doses it is extensively employed as a medicine to relieve pain, relax spasm and compose nervous irritation in general. It owes its properties chiefly to a colourless oily liquid, with a penetrating, mouse-like odour to which the name Conia has been given. I have on many occasions derived marked benefit in its use for colic in the horse.

Hemlock, and its alkaloid conine, paralyses the motor centres of the corpora striata, afterwards of the cord (Dr. Harley). Poisonous doses paralyse the muscles of respiration, and kill by asphyxia. Medicinal doses are motor depressants, and hence are anti-spasmodic and anodyne in doses of fluid ounces of the succus 2 to 4.

Conine, the volatile oily alkaloid of hemlock, is a very powerful poison, scarcely inferior to that of prussic acid.

White Hellebore (*Veratrum Album*).—This active vegetable is

variously estimated. Mr. Percival cherished it as a valuable sedative and active nauseant given in doses of a scruple or $\frac{1}{2}$ drachm every four, six, or eight hours. Mr. Vonalt also praised it much for its soothing action in internal administration. We have also used it with very beneficial results; but in verification of the old proverb that doctors will differ we are told that Mr. Sewell held it in slight estimation; it has, however, crept into pretty general practice. (Blaine's Outline Veterinary Art, 1865.) He adds that as the horse was not intended to vomit, so it is exceedingly difficult to excite nausea in him. Aloes have been used for that purpose, but they are uncertain. We are therefore forced to trust to the powdered root of the White Hellebore, which is, perhaps, the most certain nauseant with us, but requires, as he adds, careful watching. It may be given to a certain point, and nothing but moderate nausea is observed; if pushed beyond this the head droops in the manger, the mouth slavers, the pulse sinks, the horse rocks to and fro, and purging comes on, which commonly proves a fatal symptom. Hellebore lowers the system more speedily than digitalis, but digitalis more safely when there is time for operation—at least, so we have found. It is for the observant veterinarian so select the proper cases for both.

Reviewing cattle and sheep, the magnitude of the quadrilateral stomach, the large proportion of food which it always contains, and the comparatively low vascularity and sensibility of the whole alimentary canal, account for the tardy, uncertain action of many purgatives. Hence arises the question of administration of purgatives in cases of poisoning. For these ruminants saline purgatives are preferable, and their action may be materially expedited by the encouraging of drinking of water. Here again, in cases of poisoning, water is best avoided. Many deaths from yew are probably hastened by the animal drinking water. This has been my experience of many cases I saw, as remote as 1885, at Exeter, Devon.

The peculiarity of the action of medicines in cattle is chiefly referable to the construction of the alimentary canal, and to their phlegmatic temperaments. In these ruminants the stomach is quadrisected, is extensively lined with cuticular mucous membrane, and as regards its first three divisions is less vascular and more mechanical than in man, dog, or horses in its action; hence vegetable poisons are longer in affecting the ruminant than these animals. The first and third compartments of the stomach always contain food, often in large quantities. These facts, as stated above, explain why cattle require such large doses of all medicines, why considerable quantities of irritant and corrosive poisons can be given them with comparative impunity, and why purgatives (unless

in large doses and in solution) are so tardy and uncertain in their action.

DISEASES.

The existence of disease modifies the action of medicines. A congested or inflammatory condition of the alimentary canal retards absorption, and the consequent activity of medicines given by the mouth. When excretion is hindered, medicines are usually retained longer in the system, and hence act more powerfully. Conversely, when excretion is active, as in diuresis, diabetes, or diarrhoea, many medicines (as opium, belladonna) and many poisonous agents (as rhododendron, etc.) do not manifest their full activity.

Habit.—Wood says that the continued use of certain medicines, the gradual eating of a poisonous herb, alters the degree of action. This is quite feasible. Virginian deer, by habit, are said to thrive on tobacco; some monkeys feeding on strychnine-containing nuts are said to become insusceptible to strychnine.

Further, most vegetable substances are liable to be modified by soil, climate, and cultivation. Medicinal plants are usually most active when indigenous, but to this rule the Opium Poppy and Tobacco are notable exceptions.

Species of Patient.—The several classes of veterinary patients are differently affected by many medicines. The differences are chiefly in degree rather than in kind, and depend upon variations in organisation and function. On the circulatory, respiratory, and ordinary systems, which nearly resemble each other in man and the lower animals, medicines act uniformly. Thus aconite, digitalis, and nitre produce very similar effects in man, horses, dogs, and cattle. Great diversity, however, occurs in regard to medicines acting on the nervous, digestive, and cutaneous systems, which differ considerably in the several species of animals. The more highly any organ, or system of organs, is developed, the more susceptible does it become to the action of medicines—and, it may be added, to diseases also. This general law explains why the highly-developed human brain is specially susceptible to the effect of such cerebral medicines as opium and chloral, and why frogs (whose spinal system is developed at the expense of their brain) are so susceptible to strychnine, which acts specially on the cord. The human cerebrum, the seat of intelligence, is more than seven times the weight of the mesocephalon and cerebellum.

In the domestic animals the cerebrum is about five times the weight of the posterior parts which regulate motor energy, while the cord is relatively larger than in man. This relative development explains how such medicines as opium, chloroform, and chloral cause in man blunted intellectual function and deep stupor, while in the

lower animals they produce deranged motor function and convulsions.

Lastly, with regard to the particular condition of the animal taking or receiving poisonous agents, we must remember the phenomena of (1) idiosyncrasy, (2) tolerance. Large quantities of most vegetable agents are necessary to exert a poisonous action on herbivora, and a small amount of animal poison is effectual; but there are marked exceptions, as in all other rules.

The phenomena of tolerance is the condition of becoming accustomed to the remedy, so that larger doses are required than at first to produce medicinal effects. Sometimes, however, agents are cumulative, so that successive doses at length simultaneously exert their action, and may thus destroy the patient. This results in the case of those agents which are not readily thrown off from the system by the excretory organs. We see this, for example, in digitalis, which only after several doses is removed by the kidneys. Certain diseases, too, may be confounded with poisoning; and it is a matter of fact that extreme difficulty occurs in some cases in making a correct diagnosis.

LEGUMINOSÆ.

Sub-Order Papilionaceæ.—This order contains a number of plants which are used as nutritious food by man or animals, such as Peas (*Pisum*), Broad Beans (*Faba*), Kidney Beans, Scarlet Runners and Haricots (*Phaseolus*), Lentils (*Ervum*), Pigeon Peas (*Cafanus*). The seeds of the above plants and many others are commonly known under the name of Pulse, and do not need any detailed description. Lucerne and Medick (*Medicago*), Melilot (*Melilotus*), Clover (*Trifolium*), Tares and Vetches (*Ervum Vicia*), Sainfoin (*Onobrychis*), and many others, are common fodder plants in various parts of the globe. Some plants, or plants of this sub-order, are, however, poisonous: as the roots of the Scarlet Runner (*Phaseolus Multiglorous*), the roots of *Phaseolus Radiatus*, the seeds of *Lathyrus Aphaca*, the seeds and bark of *Laburnums* (*Cysticus Vulpinus*), the seeds of *Anagyris Focleda*, the seeds of the Calabar Bean (*Physostigma Venenosum*), and it is also said by some (although denied by Macfadyen), the seeds of *Obrus Precatorious*, also the seeds of the Bitter Vetch (*Ervum Ervilla*), the juice of *Coronilla Varia*, the leaves of some *Gompholobiums*, the leaves and young branches of *Tephrosia Toxicaria*, the bark of the root of *Piscidia Erythine*, and the parts of some other plants of this sub-order.

This order supplies us with many useful plants, and many of the species are exceedingly beautiful. The Furze and Broom, Bean, Pea, Vetch, Clover, Trefoil, Lucerne—all staple articles of culture by the

farmer—are all species of the Leguminosæ. The Gum Arabic, Senegal, Kino, Senna, Tragacanth, and various other drugs, not to mention Indigo, the most useful of dyes, are products of other species.

There is this, however, to be borne in mind in regarding the qualities of this order from a general point of view: viz., that upon the whole it must be considered poisonous, and that those species which are used for food for man or animals are exceptions to the general rule, the deleterious juices of the order not being in such instances sufficiently concentrated to prove injurious, and being, in fact, replaced to a considerable extent by either sugar or starch.

Fodder poisoning due to eating clover contaminated by the Clover Fungi, *Polythrincium Trifolii* (*Sphaeria Trifolii Pers*), has been recently encountered by Veterinary-Surgeon Kunz, Grosswangen (Lucerne), and recorded in THE VETERINARY JOURNAL, August, 1916; and Danimann, in his text-book on Hygiene, records cases of clover fungi poisoning similar to those mentioned by the above-named surgeon. Sudden staggering or rocking of the hindquarters, with paralysis of the jaws, was seen in some cases at the onset; in others, violent convulsions and symptoms of brain irritability were also noticed, with death resulting. *Post-mortem* appearances, those of gastro-enteritis, with inflammation of the spinal marrow, as the result of the intoxication being the cause of the disease.

These, I think, are about all the collective plants which afford cases of poisoning in the practice of English veterinarians, save for a few mushroom plants which cattle eat occasionally; but death, if resulting, is not recorded; or, at least, I have failed to find any mention in the many works I have consulted. The subject is a wide one and extremely interesting, and my records will, I hope, prove of some service, or a reminder of what one has to face and combat in practising our varied calling as veterinarians.

BOTANICAL NOTES.

The common potato, which is so largely used for food in temperate climates, is the tuber of *S. Tuberosum*. A decoction of the stem and leaves has been used as an alterative in cutaneous diseases, and an extract has been employed as a narcotic and antispasmodic. The medicinal properties of the potato plant are chiefly due to the presence of a small quantity of an alkaloid called solanin, which has narcotic properties. Solanin does not produce dilation of the pupil, like the alkaloids of the *Atropaceæ*, and hence the reason why the juice of the *Solanaceæ* generally differs in such respect from that of the *Atropaceæ*. Solanin has been detected in all parts of the potato plant, but in the tuber only traces are to be found.

POISONING PRODUCED BY POTATOES.

Natural Order (Solanaceæ, or Potato).—Bissange has observed poisoning in bovines and pigs, due to the use of potatoes in nearly 800 cases. The cases are common in certain years by reason of the peculiar climatic changes that favour the conditions in the tubers. The changes are various: the potatoes may be frozen, sprouted green, or spoiled; the parings and tops may also prove hurtful.

And his conclusions are as under:—

- (1) Uncooked potatoes, even when sound, although they may produce an increase in the amount of milk secreted, ought to be given to milking cows in small quantities; they only irritate the digestive canal, and often determine a gastro-enteritis.
- (2) Cooking brings out the nutritive qualities of the potato: it removes acidity, and partially destroys the harmful action of solanine.
- (3) Frozen and diseased potatoes ought not to be utilised for feeding, because of the solanine contained. Moreover, they are poor in nourishment, the chief food principles having disappeared.
- (4) Sprouted potatoes should not be used until all the sproutings are removed from the tubers.
- (5) If the potatoes have become green, they should only be given in small quantities, and then only after they are cooked.
- (6) Potato tops should only be used for litter, and should not be used for feeding purposes.

Whatever condition sets up the disease, the symptoms of poisoning are usually the same. At the onset there is loss of appetite, absence of rumination, muscular tremors, tottering gait, weakness of the hindquarters. Later there is violent diarrhœa; the dejections have a peculiar and strong odour; there is tympany in the left flank, ptyalism, and always papillary dilatation, causing a peculiar appearance of the animal, and which sometimes makes it easy to detect the affected animals in the stable. There is somnolence and, it may be, also vertigo.

The conditions last three or four days; the loss involved is serious, having regard to the loss of condition which follows, to the falling off of the milk supply, and to the abortions which sometimes occur. In the pig there are both vomition and diarrhœa, but recovery is more rapid.

Treatment, as followed by the author, consists in the administration

of tannin in doses of from 15 to 30 grammes daily. The tannin appears to neutralise the solanine which is not yet absorbed. Stimulants are indicated toward off depression, and aromatics (coffee) were given and external stimulants applied. The author has made some experiments with solanine.

FODDER POISONING,

Due to clover affected with the clover fungi *Polythrincium Trifolii*, *Sploeria Trifolii* (Pers), has been seen; and Dammann, in his text-book of Hygiene, records cases of Clover Fungi poisoning similar to those recorded by Veterinary-Surgeon Kunth, Grosswungen (Lucerne). Sudden staggering or rocking of the hindquarters, with paralysis of the jaws at the onset, sudden in appearance. In some cases violent convulsions and symptoms of brain irritability. *P.-M.* appearances: Gastritis and inflammation of the spinal marrow, as the result of the intoxication being the cause of the disease.

Lastly, we deal with the natural order *Papilionaceæ*. The chief plant *Savin*, the fresh dried tops of *Juniperus Sabina*. *Natural Order (Coniferae)*.—By many this plant is not considered poisonous, but by others extremely so. Horses in particular have succumbed from eating of same, and in the carnivora it is extremely irritant. Abortion has also taken place in the mare Mellett (Henley-on-Thames, 1885); and its continuous use, according to this observer, destroyed unborn foals, causing their expulsion (experimentally employed).

It is occasionally used as an anthelmintic, but the *rationale* of this treatment in an enlightened age is questionable (Mahon). It acts violently on the kidneys and bladder, and should not be employed internally when so many agents are at our disposal in the present day.

THERAPEUTICS.

Treatment in cases of poisoning comprises certain general principles of great importance. The poisonous action may be arrested, if we are called in and make our diagnosis in good time, either by preventing the taking up of the poison, or its irritant action on the tissues by intermingling it with mucilaginous matter. In the case of irritants this measure might be supplemented by dilution, but this only tends to promote absorption, and therefore is inadmissible in the case of those poisons which act from the blood. Administration of such bland and mucilaginous agents as white of egg, wheat flour and meal, or even of blood, should be one of the first measures resorted to in cases of poisoning through the alimentary canal. It has this advantage, that the albuminous matters, in some instances,

chemically unite with the poisons, and so convert them into harmless and insoluble agents. But this does not apply to a marked extent when one is dealing with vegetable poisons.

Take aconite poisoning; stomach pump; emetics; hypodermic injections of digitalin; stimulants; rectal injections of salt solution; hypo injections of strychnine.

(2) Belladonna; Pilocarpine (hypodermically); morphine solutions; stimulants and coffee; warmth.

(3) Croton beans; milk or olive oil; white of egg; linseed gruel; tea; opium to relieve pain.

(4) Conium (Hemlock), hypodermic injections of strychnine; warmth and stimulants; nux vomica tincture and olive oil.

(5) Digitalis; Tannin, 3 to 12 ozs. water; strong tea and coffee; caffeine salicylate (hypodermically).

Stimulants: Spts. Aether, Nit. Liq. Ammon; Acetatis; aconite to control rapidity of heart beat.

Fungi (poisonous) *Muscarine*.

Purgatives: Castor oil; stimulants; atropine sulphate (hypodermically); tobacco; stimulants; warmth; hypo injections of strychnia sulphate.

The general treatment therefore appears to rest on "the sheet anchor," so-called, of stimulants and oleaginous purgatives, with intravenous injections of saline solution. Brandy, ether, and strychnine hypodermically form our most reliable and powerful stimulants. Well rug the patient; stimulate the extremities. In the case of a horse, well bandage, hand rub, and repeat every few hours.

As regards feeding, this is very often out of the question, and resort has to be made to oral or rectal administration of nutrients; and in the horse and dog especially I have used these.

I again beg to refer to poisonous fodder, and to record a bad attack in five horses in 1893, when practising in North London, when I administered vinegar and water with whisky (2 ozs. vinegar, 1 pint water, 2 ozs. whisky) to each horse every four hours; gave strychnia hypodermically, milk to drink, linseed tea, and saved my patients. The hay was mouldy and had been placed on the stable floor as bedding. What morbid state of the appetite induced the horses to eat hay is beyond me. Abdominal pain was combated by Tinct. Opii, and in a few cases my old friend "Chlorodyne."

During my service on H.M.S. *South Africa* I encountered a few cases in Hungarian horses on the Transport "Anglo-Canadian." Here I gave warm salt water, and the horses speedily recovered. I do not know whether this treatment would answer, however, in every case, but it

did here, and one had not the pharmacy of old England to fall back upon. Anything likely to suit the cases was the order of the day.

Hawthorn Poisoning.—Several cases are recorded by Mr. Alfred Mar-ton, M.R.C.V.S., Winforton, Herefordshire, November, 1898, *Veterinarian*. Impaction of jejunum, enteritis, rupture of the stomach, and death in many cases.

Common Laurel.—Natural Order, Rosaceæ, Sub-order, Duperaceæ (Amygdalæ).—The leaves, bark, and fruit of *Prunus Lauro-Cerasus* (the common Laurel, or Cherry Laurel) are poisonous; their poisonous properties are due to the production of volatile oil, containing hydrocyanic acid when they are moistened with water. As the leaves, etc., are bitter, any animal, if water is available—as it often is at pasture—would drink heavily, and thus aggravate the conditions, leading to constitutional disturbance, and death.

Lobelia Inflata.—Indian tobacco resembles tobacco in its action. Several fatal cases of poisoning have occurred in the United States and in this country from its empirical use.

Almond, *Amygdalis Communis*, Var *Amara*.

Sub-order, Chrysosbalandæ; Natural Order, Rosaceæ.

A. *Persica* (Peach Tree). The flowers, bark, etc., possess poisonous properties, owing to the formation of hydrocyanic acid.

Lastly, I refer to poisonous fungi, the chief of which is the *Agaricus muscarius*. Muscorine was discovered by Schmiedeberg and Koppe. Neurine and chlorine also are toxic, and derive additional interest from their close resemblance to muscarine. Chlorine and neurine are the toxins found in undecorticated cotton cake, and which killed several milch cows.—*Veterinarian*, December, 1898, p. 675—cases being those recorded by Mr. James Peddie, Dundee. These toxins are antagonistic to atropine, so far as relates to their action on the heart and glandular system. Halliburton, in "Schafer's Text-Book of Physiology," 1898, refers to these actions.

Again, *Amanita* (*Agaricus Muscaria*) is a very poisonous species of fungi. It possesses narcotic and intoxicating properties, and is much used in Kamschatka and other parts of the Russian Empire as a narcotic and intoxicating agent. This fungus possesses the remarkable qualities of rendering fluid the excretions of those who partake of it. When steeped in milk, etc., it acts as a poison to flies; hence its specific name. Undoubtedly it would cause serious disturbance in cattle, and experiments would go a long way to prove this (Mahon).

Careful research into all known "vegetable poisons" is herein tabulated, and I must offer my apologies for the length of a too-neglected and very often overlooked study in the practices of the veterinarian—viz., Toxicology. In my student days I (with a few

surviving veterinarians) had tuition from the late Dr. T. S. Cobbold, M.D., lecturer in Helminthology, who also lectured to us on botany, and in our excursions around the country pointed out, collected, and distributed specimens, which many of us kept. A few of us, no doubt, pursued the study of poisonous plants in later years. Poisonous plants furnish baffling and interesting cases for us. We treat the cases and suspect the poison, but too often we do not discover its source.

Clinical Cases.

PUNCTURED WOUND OF THE HOCK IN A CART MARE.

By G. MAYALL, M.R.C.V.S.

A BLACK cart mare, 7 years old, was kicked by her next stall neighbour on November 21st. I was called in to see her on the morning of November 24th, she having been working in the interval. I found a punctured wound on the outside of the near hock discharging blood and pus. The hock was clipped, the wound cleansed, and I injected it with a strong solution of iodine, and left instructions for this to be done three times daily. The next day the mare was very lame. A dose of physic was given, and the injections continued. The discharge was still profuse, and the mare showing increased pulse and signs of pain. On the following day the state of the subject was slightly improved—she was not so lame, and there was a slight decrease in the discharge. Briefly, the patient remained in about the same condition until December 2nd, when she was taken to another stable where cold water irrigation of the hock joint could be carried out for half an hour three times daily, and she could be conveniently slung. At this time, too, injections of Lugol's solution and glycerine (Lugol's solution 1 part, glycerine 4 parts) were syringed into the wound three times daily, the mare being kept on laxative diet and given laxative medicine at frequent intervals. She remained in slings until January 8th, and the irrigations and injections were discontinued on January 2nd, and one of Burroughs Wellcome's Enule corrosive sublimate bougies (gr. 1-25th) was inserted into the punctured wound twice daily from the 2nd to 8th of January. On January 10th she was put to work, and has done well since.

In the October issue of the JOURNAL for 1916, at page 340, I recorded a case of open joint in the horse treated on similar lines to this case. To those who have not yet tried injections of Lugol's

solution and glycerine for open joint and punctured wounds of joints a trial is recommended, and a record of their experiences will be esteemed. At the same time, where cold water irrigation can be carried out by means of india-rubber tubing connected to a tap so that a continuous stream can be directed on to the lesion and the joint, so much the better.

THE OPERATION OF GASTROTOMY AND ENTERECTOMY UPON THE DOG.

By CANIS MAJOR.

THE patient was a Scottish terrier, 2½ years old, having been under treatment by my locum during my absence from home for interdigital abscess. The case had been a particularly troublesome one, the treatment surgical, whilst the resulting operative wounds were difficult to heal. The owner soon afterwards, on taking a holiday and the dog with her, had occasion, owing to the dog becoming so poorly and so emaciated, to seek further advice. The diagnosis revealed that the dog was suffering from a septic poisoning resulting from being allowed to lick the operative wounds over a long period.

Upon the owner returning, the dog was brought for my inspection. I was surprised to observe his impoverished condition, the history of the frequent vomition leading me to make a careful manipulative examination of the abdomen, when the presence of a hard substance could be detected, which I concluded must be a foreign body. Upon mentioning my suspicions to the owner it was remembered that in May of last year he had been given an imitation rubber bone to play with, which he had torn up, swallowing several pieces, and rejecting again what the owner thought was the whole amount swallowed; at any rate, not the slightest suspicion was entertained of the retention of any part; in fact, the matter had been quite forgotten.

An operation was suggested and agreed upon, and carried out upon October 28th, 1916, under strictly aseptic precautions. The prepubic area was chosen, the hair shaved over a considerable area, washed with disinfectant liquid soap, and the lines intended for incision painted over with Tincture of Iodine. All instruments having been previously sterilised, an incision 3 inches in length was made through the skin, and the subcutaneous fat removed to facilitate operation; next the abdominal muscles, and lastly the peritoneum were incised. Digital exploration disclosed the presence of the foreign body in a forward direction—in fact, in the stomach. Some difficulty was experienced in bringing this organ *in situ*, the patient having to be raised by the shoulders for this purpose.

A clean piece of linen, previously sterilised, with an aperture corresponding in size to the operation wound, was laid over the part, and the stomach brought through the aperture and laid upon it, when the foreign body was easily seen, and, in fact, seemed to be almost the only contents of this organ. An incision was now made through the least vascular parts, and at the broad end of the substance, and by exercising a little pressure the foreign body—a piece of india-rubber—was evacuated. The serous coat of the stomach was now carefully cleansed with tampons of sterilised cotton-wool and the iodine solution, six sutures of strong catgut inserted through the serous and muscular coats, the abdominal muscles similarly sutured, whilst silk was used for completing the suturing of the skin, the operation area, well dried, coated over with collodion, a pad of cotton wool, and bandaged.

The anæsthetics employed *were* 1 grain of Morphine Hydrochlor subcutaneously about half an hour before preparing the operation area, and chloroform slowly administered during its performance.

This being the first gastrotomy I had undertaken, I was agreeably surprised next morning to find my patient in such fine form, all effects of anæsthetic and anticipated shock of the operation having passed away; in fact the greatest difficulty was experienced in keeping the animal quiet, he being of rather an excitable and bellicose temperament, desirous of strafing any of his species in the near vicinity, and was only rescued with difficulty from an Airedale whom he had attacked. He remained in my infirmary for one week from the date of operation, the owner wishing to nurse him at home. The wound healed by first intention in about ten days, and scarcely troubled him; appetite ravenous, no variation in temperature, nor apparent constitutional disturbance. From the date of his discharge, November 3rd, to the 9th, I attended him twice daily, and left him then to the care of his owner. On December 27th I was again consulted, as he began to display the same symptoms as before, viz., evidence of pain by extending the body, stretching out the neck, and rejecting food given to him, whilst the appetite was abnormal, seeking anything of an edible nature within his reach, and even devouring his own excrement. Palpation of the abdomen again revealed the presence of a foreign body further back, and a second operation was requested and carried out upon January 6th.

The same procedure was adopted with regard to anæsthesia—viz., 1 grain of Morphine Hydrochlor about half an hour prior to operation, the flank on this occasion being chosen as the site; hair shaved over a considerable area, instruments sterilised, and the line of incision painted over with Tincture of Iodine. Next the slow administration of chloroform, and the skin, abdominal muscles and peritoneum incised.

It was with some difficulty that the foreign body was located and brought to the surface of the operative wound, and in this case it was present in the bowel. As small an incision as possible was made and the foreign body, again a piece of rubber about the size of a Brazil nut. The bowel in this region was found to be very much thickened and cedematous, and much to my chagrin would not retain the catgut sutures; in fact, after several vain attempts to suture same, I most reluctantly allowed the animal to pass away.

It subsequently occurred to me that I might have passed it gently along the bowel to within reach of the rectum, but the *post-mortem* revealed the futility of such a procedure, the affected portion of the bowel found to be the ilium, the great length of bowel to be treated, and the narrow exit from that to the cœcum; so unfortunately terminated what would have been, except for the second obstruction, a very successful case. During the period between the two operations there was an alternate increase and decrease in weight of the animal, one week gaining three or four ounces, and the following week relapsing into the former state.

The symptoms displayed were peculiar, and some rather amusing, prior to and following upon the first operation—suddenly pulling up after movement, planting the forefeet straight out, extending the body and elevating the head. In this position he would remain for about thirty seconds, afterwards resuming his walk, and later going through the process again. His appetite was abnormal, even devouring his own fœces, and whilst on his walk in the garden would rush at, seize and devour any small object resembling food, even small pieces of crumbs thrown out for the birds.

It is interesting to mention that the mode of suturing employed for the operation of gastrotomy was interrupted sutures of strong catgut, one line only through the serous and muscular coats bringing the edges into apposition, and not by Lembert's method. Upon examination of the stomach after *post-mortem* the site of operation could not be detected, so perfectly had union taken place, and it was only with great difficulty that it could be traced upon examining the interior of this organ.

Since writing up the history of this case I was called in to see an Airedale, said to have been ailing for several weeks, losing flesh, and suffering from vomiting, and upon my visit going through exactly the same performance as the preceding case—extending the forelegs, elevating the head, etc. Digital exploration revealed a hard substance in the intestine, well back. Enquiries elicited the fact that he was very keen in running after stones, and that he was daily kept busily employed in this manner at a neighbouring hospital, where the con-

valescent wounded soldiers continually humoured him at his favourite pastime, and where he was a great pet with them. The owner decided not to have an operation; but to trust to Nature. I have since heard from him that the dog has much improved, so it is possible that the offending object has passed away.

LAPAROTOMY UPON THE CAT.

A so-called Persian cat, a great favourite, said to be suffering from obstruction of the bowels, and having been dosed with the usual nauseating household remedy—castor oil—without improving in any way, was brought to my surgery. Thinking perhaps from the odour accompanying it that it was matted behind, I first examined this region, when I discovered protruding from the rectum a piece of thread about three inches long. Slight traction failed to remove it, when I recognised the fact that a needle might be its fellow. Digital examination of the abdominal muscles, together at the same time with traction on the thread, proved this to be correct.

Operation was decided upon, and carried out as in the preceding case, the point of the needle being found to have penetrated the intestine, directed backwards towards the pelvis, and here penetrated the pelvic region.

With forceps it was extracted and removed together with the thread. For three weeks the cat remained in my infirmary in a very precarious condition, endless trouble being caused by the formation of pus within the wound, and it was only by frequent irrigation with a solution of hydrogen peroxide that at last it was overcome. The cat returned home before the wound was quite healed, and the result proved quite satisfactory.

CASES OF PRURITIC DERMATITIS CAUSED BY INFECTION OF MANGE FROM THE KITTEN.*

By A. WHITFIELD, M.D.

CASES of transference of diseases of animals to human beings have always a somewhat special interest, and in this short series of cases, there is also a rather curious coincidence.

On March 10th, 1916, a gentleman developed a pruritic eruption; he consulted a well-known dermatologist, who made the diagnosis of scabies and treated him with success. On June 20th his wife's maid developed a pruritic eruption, and a few days later his wife herself became affected with a somewhat similar eruption. Shortly after this one of the children who had been staying in the country came to town

*From the Proceedings of the Royal Society of Medicine (Vol. X, No. 2).

and developed an eruption after her return to the country. The doctor who attended the family was puzzled by these cases, for although the method of spread suggested scabies he was unable to recognise the eruption as such. He therefore brought the lady and her maid to me for my opinion.

When I saw these two patients their condition was as follows : The lady had a patchy eruption of small papules, about a millimetre in diameter, surrounded by an oval zone of erythema and in some instances surrounded by a minute pin's-head sized vesicle or serous crust, the resulting lesions being not unlike those of varicella on a very small scale. These lesions were never very closely aggregated, but were in rough groups, so that the individual lesions occurred about $\frac{1}{2}$ in. from each other, and then there would be a large area of unaffected skin, about 8 ins. long, and then another rough group of lesions. The distribution was over the forearms, the upper arms, the thighs, the breasts, but not the nipples ; and over the abdomen and the scalp, but not the face. The fingers and the wrists were free. In the maid the lesions were precisely similar, but the scalp was not affected. Pruritus was intense, but was not specially worse at night.

The appearance of the eruption immediately suggested to me mange caught from the dog. I have been lucky enough to see a large number of cases of this, and I asked if the patient had a dog. She replied in the negative, but stated that they had a kitten, which scratched a good deal. We therefore sent for the kitten, and as I found it rather scurfy, especially behind the ears and on the face, I removed some of the scales and put them under the microscope. I was lucky enough to find both the acarus and a run, including eggs and faeces, in one of the earlier specimens. The kitten was chloroformed on the spot, the patients were put through a mild form of treatment for scabies, and I have since heard that there has been no recurrence of the disease.

The first point that suggests itself at once is : What was the nature of the original attack in the husband ? I have no doubt that this was ordinary scabies, since he developed his eruption on March 10th and the kitten was not born until about May 14th--*i.e.*, about two months after the husband was affected. This seems to me to be a rather curious coincidence, since two different acarine infections in the same family within three and half months must be very uncommon. Moreover, if it had not happened that the animal in question was so very young, one would never have been certain that the disease in the husband was not of the same nature. Lastly, although mange caught from the dog is certainly far from rare, this is the first instance in which I have identified the infection as coming from the cat. I would say in passing, that I regard infection with mange from the

dog as common, and with ringworm as rare; while from the cat the infection with ringworm is common and with mange rare.

I only remember seeing one outbreak of mange in cats on any large scale, and this was due to the exceptional opportunities of studying skin disease in animals that I have had for some years owing to the kindness of my friend Professor Hobday. In this instance the disease ran through a valuable cattery of chinchilla Persians, and either the disease or my too enthusiastic treatment resulted in the death of about four hundred pounds' worth of cat. I found the *acarus* likewise in the samples of cat submitted to me on that occasion, and it was very much smaller and not quite of the same shape. On looking up this question I find that the cat suffers from two forms of *acarus*, one almost indistinguishable from the ordinary parasite of human itch, but now believed to be a distinct variety; and a second known as *sarcoptes minor*, which usually causes the death of the host. I have no doubt that the very small, peculiar shaped *acarus* that I obtained in the chinchilla epidemic belonged to this variety, and may have been responsible for the high mortality rather than my treatment.

It interested me to find the extremely superficial position of the run in this kitten; it is in no sense a burrow, but rather a pathway among the scales. Hence the name occasionally given to it of "*acarus squamosus*." It appears that the position of the *acarus* and runs in *scabies norvegica*, which I have not seen, is somewhat similar.

DISCUSSION.

DR. S. E. DORE: I should like to ask if Dr. Whitfield regards this *acarus* as the human *acarus*. Fantham, Stephens, and Theobald, in their book on "*The Animal Parasites of Man*" (pp. 510-521), state that the human *acarus* can be artificially transmitted to horses, dogs, and monkeys, but not to cats. The *sarcoptes minor*, however, which infects cats and rabbits, causes in man an eruption lasting about a fortnight. I take it that it is more likely to be the small *acarus* in this case than the ordinary human *acarus*.

DR. WHITFIELD (in reply): This is not the small *acarus*; I do not think it is the human *acarus*. I looked up the book mentioned a few weeks ago, and it is there stated that all these animal *acari* are distinct. But the *sarcoptes minor* is much smaller, and is not quite the same shape.

[Having suffered from scabies caught from a cat and diagnosed by the late Dr. Morse, of Norwich, and myself, I, for one, am convinced that mange of the cat is communicable to man. The scabies, in my case, extended from the right wrist to the shoulder and was cured quickly by the application of ordinary sulphur ointment. Two military friends of mine have recently suffered from what has been diagnosed as scabies, presumably contracted from the horse.—G. M.]

Abstract.**THE FACTORS UPON WHICH THE EFFECT OF DISINFECTANTS DEPEND.**

BY PROFESSOR WALTER FRIE, of Zurich University.

THE effect of our disinfectants is conditional upon their constituents and properties and those of the milieu and bacteria they are brought in contact with. Shortly, the action of disinfectants depends:

- I.—(a) On their chemical constituents, structure and properties.
 - (b) Physical and physico-chemical properties.
 1. Degree of dissociation.
 2. Solubility in water and elements of the bacteria.
 3. Colloid condition in concentration.
 - II.—*Medium*:
 - (a) Dissolving power of the disinfectant and influence of the same—associability with the solution.
 - (b) Internal trituration.
 - (c) Third substances which influence the disinfectants, the medium or the bacteria.
 - III.—*Bacteria*:
 - (a) Largeness or minuteness of the same—extent of its outside surface.
 - (b) Colloid condition—Soakability and fitness for precipitation:
 1. Of the membrane.
 2. Of the protoplasm.
 - (c) Chemical constituents, structure and properties.
- As a further factor to be considered is:
- IV.—*Temperature*.

That we do not gain satisfaction from present-day disinfectants is clear. The ideal disinfectant—that with the merit of enormous bactericidal power—possesses the advantages of great cheapness, easy solubility and handiness in water, only slightly toxic for animals, united with unlimited strength, and, if possible, lacking also in smell is not yet found.

Finally it must be remarked that the study of disinfection is not complete without a clear understanding of the life and death conditions and phases of micro-organisms, and a further survey shows us that a knowledge of the life and death of cells of higher organisms, especially of hæmolysis, necrosis, and of intoxications is also necessary. In this connection the teaching of disinfection must call to its aid the sciences of physiology, general pathology, pharmacology and toxicology.—*Swiss Journal of Veterinary Medicine*. G. M.

Translation.**THE INTRA CUTANEOUS TUBERCULIN TEST ACCORDING TO ES AND SCHALK AS A DIAGNOSTIC IN FOWL TUBERCULOSIS.**

BY JAKOB AND GAZENBECK.

THESE authors examined twenty-four hens, of which sixteen proved tuberculosis, and eight free from tuberculosis. They employ

50 per cent. avian tuberculin. The healthy fowls all gave a negative reaction. Of the sixteen tuberculosis subjects, eight gave positive, two doubtful, and six negative reactions. These last were intensely tuberculous and emaciated, and could already be recognised during life as badly affected with tuberculosis. Slight, and in a small degree, affected cases of the disease could be diagnosed by the intra-cutaneous reaction even at a stage when the hens seemed apparently healthy, and on account of open intestinal tuberculosis were a source of great danger to surrounding life. The authors, on this account, consider the method as a good diagnostic procedure for the early recognition of tuberculosis in fowls (according to Leeuwen, Bern Dissertation, the intra-cutaneous test in fowls gives gratifying, if not wholly successful, results).—(G.M., *Swiss Veterinary Journal*).

Review.

THE CARE OF THE HORSE AND MULE, AND HOW THE HARNESS SHOULD FIT—with 27 illustrations. Compiled and illustrated by R. J. Day, Lieut., The Machine Gun Corps. For the Guidance of Officers in training for Transport Officers and horsemanship; price 2s. net. Published by E. J. Day & Co., 6, Gerrard Street, London, W., 1916.

At a time like the present, when many novices have enlisted with horse regiments, there is plenty of room for a short and plain manual dealing with the care of horses and mules, and the proper fitting of their trappings. Mr. Day has produced a very handy little book which neither errs in being too verbose nor too laconic. It contains all that the horseman requires to know as regards the essentials of an intelligent comprehension of his duties as they affect his charge. It will familiarise the new recruit with terms in horse jargon which, without an explanation, will be more or less double-Dutch to him, and to the man who thinks he knows all it will be a valuable guide if he is only humble enough to accept its teaching. Horses and mules will always be needed for many of the guns, and for transport work, and a book devoted to this phase of military work is eminently desirable. The book has been written more especially for those in the Machine Gun Transport, but it will be quite as useful to all mounted officers. The points of the horse are plainly illustrated by diagrams and illustrations, and the correct fitting of bridle, saddle and harness is described and delineated. There are short sections on grooming, the position of ailments, watering and feeding, duties of a transport officer, and killing a horse humanely.

We do not quite see the force of calling the part indicated at 9 on Plate 1 "the jaw." We would rather call it "the cheek," and in any case it is only one jaw. The point at 26 is "chestnut," and not "Chest Nut." Splints at page 32 are said to be hereditary, or due to external violence or strain. We think that perhaps in 70 per cent. of cases they are due to concussion. A horse having wind-galls is said to show "use"; we think "wear" is a better term.

Mr. Day has produced a very valuable little manual, attractively bound, that is worth far more than the small sum of 2s. asked for it. It deserves to be, and we trust it will be, found in the hands of all transport officers and mounted men desiring to be well up in the technique of their duties.

A handy, durable and serviceable atlas, illustrating the points of the horse, accompanies the book at the price of 9d. extra, and is well worth study. It contains a description of the markings of the head, which is the first we have seen in print. By means of it the mysteries of "race" and "snip" are explained, but we miss any reference to our old friend "snitch."—G.M.

MENTIONED IN DISPATCHES.

Mentioned in Sir D. Haig's despatch for distinguished and gallant services and devotion to duty.

Anderson, Temp. Capt. W., M.B.; Bambridge, Capt. W. J., Spec. Res.; Bone, Capt. H.; Chown, Capt. H.; Clunes, Temp. Capt. F. L.; Davies, Capt. D. G.; Fox, Capt. J., Spec. Res.; Hobday, Temp. Maj. F. T. G., F.R.C.V.S.; Hogg, Capt. F.; Howard, Lt. P. S., F.R.C.V.S.; Huston, Capt. P. D., Spec. Red.; Ives, Temp. Qrmr. and Hon. Lt. J. F.; Lake, Maj. B. L.; Lalor, Capt. A. G.; Laurie, Temp. Capt., J. H.; Nicholas, Capt. A. V., Spec. Red.; O'Donel, Capt. S.; Porteous, Capt. R.; Slocock, Capt. S. L.; Walker, Capt. (temp. Maj.) W. H.; Webb, Maj. E. C., F.R.C.V.S.; Weir, Temp. Capt. F. J.; Williamson, Capt. D. R., Spec. Res.; Wright, Capt. J. H.; Anthony, Capt. H. L.; Finch, Capt. R. (N.Z.A. Vety. Dpt.); Foster, Capt. A. N., F.R.C.V.S.; Fletcher, Capt. S.; MacDonald, Capt. M.

Cooper, No. 326 Sgt. (acting Regtl. Sgt.-Maj.) W.; Hunter, SE/7924 Pte. (acting Cpl.) S.; Knight, S. R., 30 Sgt. (acting Staff Sgt.) H. H.; McSherry, No. 251 Sgt. (acting Regtl. Sgt. Maj.) B.; Shore, No. 327 L.-Sgt. (acting Staff Sgt.) J. L.; Yorke, 2180 Farrier Staff-Sgt. (acting Farrier Sgt.-Maj.) S. E.; Smith, No. MN. 66 Sgt. W. L.

NOTICES.

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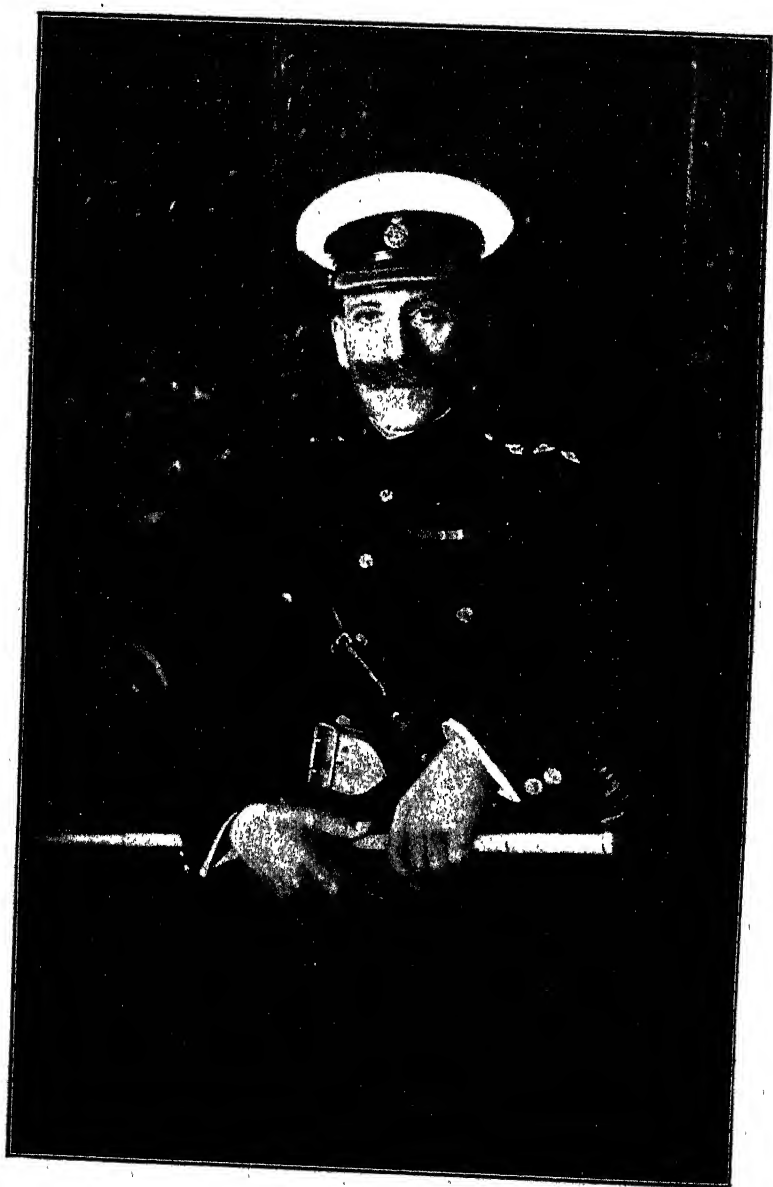
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MAJOR-GENERAL SIR ROBERT PRINGLE, K.C.M.G., C.B., D.S.O.
DIRECTOR-GENERAL OF THE ARMY VETERINARY SERVICES.

THE VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING;
MAJOR IN THE ARMY VETERINARY CORPS, AND FORMERLY PROFESSOR IN
THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

MARCH, 1917.

Editorial.

FOOD SUPPLY.

INCREASED food supply depends upon increased agricultural activity at home, or additional imports of food stuffs from overseas. The liveliness of the enemy submarines is perceptibly curtailing the supply of imported food stuffs. We depend more and more upon energy and foresight in our own Isles to overcome the deficit.

The whole matter of a stable and progressive increase of cereals, flocks, and herds, rests upon certain factors which are hard to drive into the understandings of the majority of politicians. Agriculture has never been represented in the House of Commons as strongly as it deserves to be, considering its paramount importance to the well-being of the nation. The manufacturers, the financiers, the law makers have all had their interests better cared for and looked after than the farmers. The farmers need more men of their own class to represent them in Parliament before, under present conditions, they will secure the necessary driving force to put agriculture at full and safe speed ahead. To get the best human material back to the land and to produce the willing and patient peasant who nurses the soil lovingly and profitably, and gathers from it a wealth of nutriment that enables man and beast to live, we must house this valuable worker and toiler in a comfortable and decent fashion.

The first and root factor in any material agricultural revival is an increase in the number of good rural cottages. We are not out to write where the money is to come from to build these houses, but we note that the National Health Insurance Committee seems to have a surplus of £12,500,000 on recent working, and suggest that some of this excess money might be expended in this way. The healthy man

often wonders what he gets out of the National Health Insurance scheme. Almost all of us contribute to it. Have we ever calculated what we get out of it? Security of tenure for the tenant farmer, and good wages for the agricultural labourer are two vital factors in true agrarian advance. In some cases the men elected to County Councils and other governing and administering bodies have been veritable examples of square pegs in round holes (men uninterested entirely in the land), whilst well known agriculturists whose advice and counsel would have been invaluable have been ignored.

The men who control the purse-strings of the Treasury need also to be knowledgeable men, able to take long views, to recognise that social, moral and economic benefit come to a nation from wise, remunerative land enterprises. The give £100 spirit, when it has been decided by those who know that £200 is necessary, wants getting rid of for ever from Treasury procedure.

The unfortunate thing at the present time is that there is a shortage of labour on the land. In England and Wales wheat and oats show a less area of cultivation and a less yield of bushels per acre in 1916 than in 1915. Wheat, beans, potatoes, peas, and mangels, were in supply far short of our requirements. The cultivation of sugar beet has been quite insufficient.

Horses have increased in number from 1,287,180 in 1915 to 1,359,570 in 1916, and cows and heifers have decreased by 31,000, whilst pigs are reduced by 252,000. The importance of milk and pork in times of stress is well known and steps ought to be immediately taken to check these decreases. It is not to our credit that we produce the smallest number of pigs amongst great agricultural countries.

Ireland, not troubled so much as her sisters by labour shortage, has shown a gratifying increase in her stock production. Horses have increased by 38,000, cattle by 126,000, sheep by 163,000, pigs by 85,000, goats by 50,000, and poultry by 383,000. Hay has shown almost a record crop, 2.3 tons to the acre. Scotland shows a decreased crop in wheat and potatoes, and, as in England, an increased crop of barley. The moral is obvious and is chiefly a matter for the Treasury. Cows, sheep, and pigs show a decrease in Scotland, whilst horses have been on the up grade.

What will be the result in 1917? Who can tell?

With a wise progressive policy and adequate labour, we may not only weather the storm, but plant the roots of a firm and flourishing agricultural revival, which will give the industry the security and status that it ought to have had long ago in our Island home. This security and status ought to be grounded and founded for ever. To succeed and to establish our position on the rock we must insist on the

things mentioned in this article being done, and a few others that will occur to the man thinking all round the subject. We cannot do better than close our thesis with the words written recently by Mr. H. W. Palmer, the Secretary of the National Farmers' Union. He writes:—
"We can play with politics, with industry, with law, and even with the consuming fires of 'civilised' warfare, but if we value the future of our country, our Empire, and our race we cannot any longer afford to play with agriculture."
G.M.

Original Communications.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.

BY CAPTAIN A. S. LEESE, M.R.C.V.S.

AN apology is necessary for placing these notes before professional readers in a somewhat random form. The war has prevented me from finishing a book on the one-humped camel; my notes and records are waiting in England, and I am writing now from memory. Camels are to the fore in several theatres of war, and it has struck me that there are not many veterinary surgeons who have lived along with camels in the only place where they can be really studied in health as well as in sickness—that is, their grazing country, the bush and the desert; and that possibly some service may be rendered by jotting down some of the conclusions formed and experiences gained in eight years of life under those conditions on three continents.

I shall attempt only an outline of what is known about camel-disease in the hope that it may be of assistance to veterinary men whose experience has, hitherto, been with animals other than the camel, and who find themselves in veterinary charge of camel-units in this war; only points referring to male working camels will be touched upon. Camels are splendid patients, because they rest well, make little of pain (within reason), and are easily handled. One veterinary surgeon who is keen can do more to alleviate the sufferings of camels than all the societies that ever existed for befriending animals. But nothing can be done by standing around slapping your leg with a cane.

Rutting.—In the Northern Hemisphere, rutting in camels occurs in the latter half of the cold weather, except in Somaliland. If grazing has been good the previous hot weather, a camel may rut from December to March. Usually it is in January and February that male camels are most violently "musth." There is no need to describe the symptoms; they are obvious enough. The pink or piebald "bladder" which is periodically belched out of the mouth of a musth camel is

simply the expansion of the soft palate which is normally lodged in the pharynx. Among a number of male camels running together in the jungle, the biggest and strongest only becomes musth; if another camel begins to get musth there is a fight between the two; the winner continues to be musth and the loser ceases rutting.

Veterinary advice may be sought as to how to combat the injury done by musth camels; because musth camels are more vicious than usual and may inflict severe injuries on men or other camels (thereby greatly increasing the number of casualties in camels); moreover musth camels do not thrive, and they are noisy, and dirty to handle.

The difficulty may be got over entirely by a general policy of castration of all working males, but this has serious disadvantages. Castration before six years of age leads to great deterioration in bone, muscle, and stamina, the gelding becoming, in fact, rather like the cow-camel in general appearance; castration over the age of six is liable to be followed by a fair percentage of loss due to the operation, and this loss, it must be remembered, is of camels in their prime, and is therefore no trivial one. The minimum of loss is sustained by using a "castrator"; the best are of colonial patterns. The cord should be severed as high up as can be reached. Adult camels should be chloroformed for the operation. Unfavorable sequels are much as in the horse; enlargement of the stump is one, but it is more amenable to removal than true "scirrhous cord."

In India and Egypt it is not the custom to castrate camels. In Somaliland, about 65 per cent. of camels are castrated; of these, a few are destined for eating, but the majority are done simply to obtain peace in the herds; for the Somali camel does not normally do much work except during short periods, and is not required for heavy loading. In Australia, only the camels used in teams (in harness) are gelded; this is done to prevent fights in the team. Throughout the camel world, the entire is easily recognised to be larger, stronger and a bigger weight carrier than the gelding, unless the latter was operated on as an adult.

When castration is not adopted, the best treatment for a musth camel is hard work. He should be given all the odd jobs, and will lose less condition by hard work than by being left alone with his thoughts. The damage he does is chiefly by his tusks; these may have the points cut off by a saw not more than $\frac{1}{4}$ in. from the point, and rounded off afterwards with an equine tooth-rasp; he will not then be able to inflict very serious injuries. Musth camels may inflict fatal injuries by biting other camels in the throat, jugular vein, testicle, or flexor tendon-sheaths.

NORMAL AND ABNORMAL TEMPERATURE, PULSE AND RESPIRATION.

The Temperature is as useful in camel practice as a guide to diagnosis as it is in horse-practice, but the normal fluctuations, which are great, must be known by the veterinarian. In the camel, the temperature is at its lowest at dawn and gradually increases until sunset, after which it gradually sinks again during the night. In addition to this, there is a great variation in temperature as between one day and another. The normal temperature may be described as follows :—At 6 a.m., average 97.5° F., extremes 94° to 98.6° F. At 6 p.m., average 100.6° F., extremes 99 to 101.7° F. at noon; the temperature is halfway between these figures. The highest normal limits are reached on days or nights of stifling heat; and a cold rain-storm may reduce the temperature of the animal to the lower limit. When camels are much worried by flies, the temperature is useless as a guide.

Fever is present if under ordinary conditions the temperature is :—

At 6 a.m., over 98.6° F.; at 6 p.m., over 101.7° F.

Pulse varies a good deal in frequency, generally 45 to 50. It is most palpable in the posterior tibial artery in the sitting position with hind feet flat on the ground and hocks raised.

Respirations.—Five to seven a minute during rest, but are most frequent at midday. Anything over twelve a minute is abnormal. Camels readily show the clinical alterations in the character of the respirations associated with the painful febrile diseases, such as pleurisy and peritonitis. Respiration is greatly increased in frequency by pain.

SYMPTOMS OF ILL-HEALTH.

Fever.—Besides the abnormal temperature already described, the common symptoms shown by feverish camels are loss of appetite, cessation of cud-chewing, increased respirations, drooping forward of head and neck, and a slight discharge of tears over the face. Fevered camels often prefer to face the sun; the tail is motionless and the wrinkles over the upper eyelids smooth out. A warning must be given here against judging a camel's appetite by the way he tackles his rations; many camels will be quite "off feed" on the grazing-ground, and yet will come in and clean up their rations as usual. Grazing requires a certain amount of effort, and the fevered camel will not make it. Consequently, it is necessary to ascertain how the patient behaved when out grazing, if one is to judge "loss of appetite." A camel which will not eat his grain ration is generally more than a little sick.

Pain.—Abdominal pain is shown by rolling about, as in the horse, or by sitting with the hind feet tucked to one side, and the belly pressing on the ground. The number of respirations is greatly increased. Pleurisy is shown by the classical changes in the respiration. Peritonitis (which occurs without warning in the camel) is

accompanied by a marked interval between inspiration and expiration. Intense pain elicits lugubrious moaning and lachrymation. Grinding the teeth occurs sometimes in "lung abscess"; but is normal in musth camels or in camels which have just eaten salt. Grunting is in the same circumstances as with cattle, but generally on rising from the sitting position. Another warning is, perhaps, advisable here; that is not to assume hastily that a sitting camel which is frequently fidgeting from one side to the other is suffering from colic; it is more likely suffering from an injury either to the "pedestal," or another pad.

Cough.—Natives are very unobservant as regards the cough in broncho-pneumonia in camels. This is a soft, sigh-like cough, and is most often observed in the early morning, and soon after a camel rises from the sitting position. Violent fits of coughing occur sometimes in pharyngitis, laryngitis, and bronchitis; they may often be stopped by seizing the camel's head and holding it down with the lips touching the ground (the camel being in the standing position) for a minute. The common cause of chronic cough in camels is abscess in the lung; this is a sequel to pneumonia, and is not usually pyæmic from wounds, as I have seen suggested.

Nasal discharge is seen in catarrh. In frontal sinus trouble pus generally comes from *both* nostrils and does not smell; it is unlike equine cases in these respects.

Diarrhœa occurs readily with certain changes of grazing. Salvadoras, seaside salsolaceous plants, mangrove, wild jujube and many other good grazing bushes will cause it when camels first come on to them, as also will various fodder crops fed green. A nervous camel will have diarrhœa if he is frightened or hurt.

Constipation.—Normally the dung pellets are soft, convex on one side and concave on the other. With constipation they become cylindrical, hard and dry, and this is particularly the change one looks for daily as an indication of over-dosing when treating trypanosomiasis by methods involving the use of Soamin (Atoxyl).

Debility.—The common causes of debility in military operations are overwork, under-feeding, working at unsuitable hours, exposure to cold, working hard before the second pair of incisors is cut, mange and its curative dressings, want of time to acclimatise in imported camels, unfamiliar nature of grazing in imported camels, advancing age, and trypanosomiasis. Trypanosomiasis is, excepting in Australia and in the Somaliland Protectorate, by far the most important disease of camels; it is widespread, difficult for the inexperienced to deal with, often difficult to diagnose, and few Camel Corps are entirely free from it. When every precaution is taken against it as a routine measure, and when the C.O. can be convinced of its

overwhelming importance, it can be kept under control ; not otherwise. During peace time, the efficiency of the camels in Camel Corps chiefly depends on the thoroughness with which this disease is provided against. No one but an experienced veterinary surgeon is competent to supervise the routine measures which have to be taken to prevent trypanosomiasis getting hold in a Camel Corps. Much of the heavy mortality from trypanosomiasis in military and civil transport and riding camels is due to the want of competent veterinary control, and to practices based on the extraordinary theories which C.O.'s are apt to indulge in with regard to the disease if allowed to do so.

Among the less common causes of “debility” are tuberculosis, very heavy invasion of lungs and liver by hydatids, filariasis (if very heavily infected), internal abscesses, and overgrown molars. If a “debility” case fails to improve at all after five weeks’ good feeding and attention, and is not suffering from either trypanosomiasis or filariasis, it is best to destroy the animal. Camels which get very low often suffer from a severe anæmia with atrophy of the heart-walls, which nothing will cure. Such cases entirely lose their “back-muscle” and that of the quarters.

There is a certain conformation often met with in camels which should be avoided when purchasing, as the animal so built never does well. A fair-sized hump may be present in the conformation referred to, yet there is a deep concavity just below the withers, and there is a sort of trench along the back on each side of the hump ; the quarters are flat or concave, and the ribs are very obvious. The function of the hump, as a storehouse of fat to be drawn upon according to the needs of the animal, appears to be in abeyance in these camels.

A peculiar feature in “debility” cases is the enormous variation between the morning and evening temperature, without any fever being present. The difference may be as much as 7° F. (94° to 101°).

TRYPANOSOMIASIS.

It is unnecessary to remind professional readers that this disease is a recurring fever due to trypanosomes in the blood, and that, in the intervals between the febrile attacks, trypanosomes are generally absent from the blood. I propose only to sketch very briefly the characteristics of the disease as it affects camels.

Firstly, as to its course and symptoms:—

(i) It may be acute, with almost continuous fever with trypanosomes present in the blood nearly all the time, and a fatal termination within a few weeks.

(ii) It is *more often* sub-acute or chronic ; in the latter form the intervals between the febrile attacks are longer than in the sub-acute

form and the febrile paroxysms are of shorter duration. Characteristically the febrile periods in these forms may at first be from two to five days and the intervals from three to nine days. In recovering cases, the intervals get longer and the febrile periods shorter.

(iii) After a number of febrile paroxysms the camel begins to lose condition. This is far more marked if the camel is at work than if he is at rest, but happens in any case.

(iv) Clinically, strong suspicion of trypanosomiasis is aroused by the following symptoms (in male camels) :—Irregular appetite, as shown on the grazing ground ; on some days he grazes well, on others (when the fever is on him) he stands listlessly about. The same camel may have a perfectly good appetite for rations at any time. The flank is always somewhat hollow, as the belly is rarely filled. The camel gradually shows a loss of muscular tone and does not carry his head as he should do ; it droops so that the bridge of the nose is below the level of the poll. The symptoms of fever, particularly the discharge of tears, may be noticed, but are not very marked in typical cases. Eventually he becomes thin and hidebound. The long hair near the ends of the tail easily comes out when pulled ; this is an excellent test as to whether a camel is going " downhill " or not ; when the hair-root brings with it a white speck of tissue, the camel is generally picking up ; if it appears naked (black, like the rest of the hair) the camel is nearly always on the downward track. The urine in trypanosomiasis frequently has an aromatic smell which may be noticeable towards the end of the tail. From the above description, it will be seen that there is nothing very pronounced in the symptoms of a typical case, and that is why it is so important to remember that :—

The symptoms often go unnoticed by the camelman himself for long periods.

(v) The duration, followed by death, may be any time up to three or even four years ; but the average for sub-acute cases is about one year. Recovery takes place in about 20 per cent. of camels if they receive good food and are rested most of the time throughout the disease ; but this recovery follows three years of sickness and is therefore of not much account from the practical standpoint, although these recovered cases are immune afterwards. Recovery may be expected if the affected camel improves in condition, and if the febrile periods gradually become more rare.

(vi) Death may take place in various forms, it may be sudden, and if the symptoms of trypanosomiasis have not been noticed previously it may be put down in error to anthrax, snake-bite, " cussedness," and so on. Frequently a broncho-pneumonia finishes up the affected

camel. He may die of anæmia and cardiac atrophy after slowly declining for months or years.

(vii) If a fresh blood preparation be taken from the tip of the ear during a fever paroxysm, the trypanosomes are easily seen moving about under a one-sixth objective. This is the definite means of diagnosis and can be done easily in the field. As a rule, it is not possible to find trypanosomes during the intervals between fever periods. As the disease is so common and the symptoms are not very marked it will now be recognised that a small microscope furnished with a one-sixth objective is a necessity, and not a luxury, for every camel doctor.

(viii) Although it is easy to confirm a diagnosis of trypanosomiasis by microscopic examination, it is not so easy to say that a camel is *not* suffering from this disease; to do that one would have to take the temperature daily for at least ten days, and examine the blood when any fever is found; that would, for ordinary purposes if the examination proved negative, be enough to exclude a diagnosis of trypanosomiasis in its acute or sub-acute forms, but a much longer period of observation would have to be undertaken to exclude the possibility of “chronic” trypanosomiasis, especially if it has a tendency towards recovery, because then the intervals between the fever paroxysms may run into months, and no trypanosomes will, as a rule, be found by examining the blood in these intervals. Inoculation of blood into small animals may give positive results in some of these cases; but a negative result does not justify any decision as to diagnosis.

(ix) In addition to diagnosing the disease, a veterinary surgeon must determine, if he can, by observations on the frequency and severity of the fever paroxysms, and by the other symptoms shown by the patient, whether the camel is going “downhill” (*i.e.*, whether he is suffering severely from the disease), or whether he has a tendency to recover. Without this knowledge, it is difficult to decide what to do with the patient.

As regards etiology, I have attempted below a summary of the main facts; the difficulty is to do it justice without writing a volume:—

(x) Trypanosomiasis is chiefly spread in camels by biting-flies. Excluding the tse-tse flies of Central Africa, in the bodies of which various trypanosomes undergo part of a definite life-cycle, it is the tabanus fly which acts as the chief agent in the spread of trypanosomiasis in the camel. All clinical experience is opposed to the view that the trypanosome undergoes any part of its life-cycle in this biting-fly; the tabanus seems to act as a mechanical carrier direct from a diseased camel with trypanosomes in his blood to a healthy camel. It is the habit of the fly to bite several camels before he fills his belly with blood; and the reason that he has to fly from one camel to the

other is that his bite is painful and, as a rule, leads to attempts by the camel to dislodge him. Experimentally, this direct inoculation by the means of large tabanus flies is very easy to demonstrate, and any observer who has spent time with camels grazing in a heavily-infested tabanus "zone" can see for himself the flies doing the same experiment "on their own."

Camels with acute or subacute trypanosomiasis have the parasites in the blood very frequently, and, indeed, on some days the blood is simply a mass of them, to such an extent do they swarm in it.

The extent of the spread of the disease in a herd of camels obviously, therefore, depends on the number of tabanus flies in the locality and on the number of "reservoirs" of infection, *i.e.*, the proportion of camels already affected with the disease. If the number of tabanus flies is small, and the veterinary control over the camels is such as to keep the herd free of all but the most "latent" cases (that is, chronic cases well on the way towards recovery), the disease has not much chance to spread. Where tabanus flies are plentiful, and where veterinary efforts against the disease are regarded as a "fad," and therefore a large proportion of unrecognised cases are left in the herd, nearly all the camels will get the disease, excepting the few that have gained immunity by passing through the three years of disease in their younger days.

The disease will always be serious, even when the herd is under frequent examination for affected camels, if they live where tabanus flies are numerous, because a few cases which escape the keenest detection can infect so many flies. Similarly, where no attempt is made to detect affected camels in a herd, and where tabanus flies are present, though not numerous, the disease spreads pretty widely, because the flies, though few, are so frequently sucking infected blood.

Other biting-flies may act as transmitters of the disease, provided they are very numerous and can operate on a herd already pretty full of "reservoirs" (undiscovered cases). *Lyperosia*, *Stomoxys* and *Hæmatopota* have evidence against them; *Hippoboscidae* and mosquitos have none. If proper precautions are taken against "reservoirs," there is no need to take into practical account any biting-fly but tabanus (in any camel-country other than that adjoining equatorial Africa).

(x) *Tabanus* flies are seasonal in most countries, and are found in largest number during and after rains, chiefly those falling in hot or warm weather. In very cold or dry weather, they are either scantily present, or absent. It follows that there is generally a definite "trypanosomiasis season" (there may be two) and the spread of the disease is, generally speaking, confined to these rainy seasons.

Another complication to this complicated problem is that in some places tabanus flies never breed, and these places remain havens of refuge for camels in the trypanosomiasis season. The “desert,” with its vegetation refreshed by the rain, makes camel-keeping possible in many countries where otherwise the animals would be wiped out by trypanosomiasis. Every hot-weather-rains, the tabanus-free desert is the refuge of camelmen, who have learnt, by the tribal experience of centuries, that their camels cannot be maintained in well-watered localities in the rainy season. A sandy soil is almost a guarantee of a tabanus-free “zone”; but the character of the vegetation is another good guide to experienced men, because the amount of moisture suitable for breeding tabanus is sufficient for the presence of certain kinds of trees and bushes; nothing but jungle-experience will teach these things. As a rough guide, it may be said that in or after the rains herds of camels are liable to be severely affected by trypanosomiasis if grazed or kept in the following zones:—(a) Rice-country; (b) low-lying country liable to flooding; (c) jungle chiefly composed either of the largest sized acacia trees, or of low tamarisk bush. Canal-irrigated country varies a good deal as regards the number of tabanus flies. The Himalayan foothills with their heavy rainfall, and any low-lying heavily grassed country, are infested by tabanus in the rainy seasons.

Preventive measures are all-important; success in camel-keeping in India and most camel countries, excepting Australia and the Somaliland Protectorate, depends on them. They are:—

(i) Provision of grazing throughout the tabanus seasons in country containing few or no tabanus flies.

(ii) Early diagnosis of affected camels; this is done by establishing, as a routine of stable management, the taking of the temperature of all camels at least twice a week; it is easily and quickly done by employing about ten thermometers ($\frac{1}{2}$ minute) with ten camelmen to insert and retain them. Any camel with a fever temperature should have a drop of blood taken from the tip of the ear and be examined under one-sixth objective for trypanosomes. A portable microscope suitable for this work costs only five pounds.

(iii) Segregation, into veterinary hands, of all cases discovered.

(iv) When purchasing camels into a unit, the same precautions as in (ii) are necessary; and, since a one-day examination is all that can usually be obtained, the purchasing officer should have as great experience of camels, and of trypanosomiasis, as possible.

(v) When it is inevitable that camels should be sent into country heavily infested with tabanus, keep them in small groups; and it may be useful to remember that in very hot weather, tabanus is chiefly active from dawn to 10 a.m. and from 4 p.m. to dusk, whilst in cool

weather he prefers to bite at midday. *Carcases* of camels dead of trypanosomiasis are not long infective in hot climates, and biting-flies do not suck their blood. There is no need to burn the carcase, but it will wipe out the local population of pariah dogs and jackals which eat it.

Treatment of camels with trypanosomiasis.—Keeping in mind that these notes are intended for veterinary surgeons on active service, it is quite clear that segregation of affected camels with a view to the natural recovery of a minority (about 20 per cent.) after three years is quite an impracticable idea. Camels discovered with trypanosomiasis will come under two classes:—The first (the majority) will be on the downward grade and actively diseased, the second (the minority) will be on the road to natural recovery, if given the necessary chance. It is only by observation over a period of weeks that one can tell which category a patient belongs to; this observation will, in the first class of patients, show oft-recurring and serious febrile paroxysms and falling away in condition; in the second class, it will show slight paroxysms of fever lasting only a day or two, and long intervals between the paroxysms. The first class may be dealt with in various ways, viz.:—

(a) They may be destroyed, so as to prevent them acting as reservoirs of infection to healthy camels. Some may be used by the butcher.

(b) They may be worked in segregation as long as possible and then destroyed. They will not last long under this treatment. Under certain circumstances this procedure can be adopted for dangerous and unavoidable “*tabanus*” stages on a route.

(c) They may be put under curative treatment. This treatment cures between 50 and 65 per cent., generally nearer the former figure. Emaciated animals are unsuitable for this treatment. The treatment is by the use of various compounds of arsenic and antimony. The simplest is the injection of Salvarsan (tried in Egypt by F. E. Mason), but it costs nearly as much as a new camel. The other methods have grave disadvantages—all are clumsy, involving ten or twelve intravenous injections; great accuracy in dosage and keen observation of camels under treatment is essential, and it is very hard work to treat, say, fifty at a time; for these reasons it can seldom be placed in the hands of any “native” veterinary graduate. The drugs cost from three to six shillings per camel, and treatment is a matter of twenty to twenty-three days. A few camels will die of over-dosing, and the ones which are not cured will relapse any time up to ninety days after treatment, but generally within a month. Camels cured by drugs are not immune. These methods of treatment have all been fully described in veterinary literature, and it is likely that some day they will be improved upon. In the present war, I had the hardest work to treat about eighty camels out of a strength of 103 by these methods under

camp conditions and single-handed ; the camels had to live during treatment in a tse-tse fly zone where no stock can survive, and were undoubtedly re-infected just as soon as they were cured ; nevertheless, only three died in two months out of 103, although doubtless many have died since. The trypanosome in this case was of the *T. congolense* type not the usual *T. evansi*. The best of grazing and of good rations are required during treatment.

The second class (camels with a marked tendency to natural recovery) should receive rest and good food and grazing, in segregation. This may be continued until no fever periods have been observable for, say, two months, by which time, if condition has been regained, the camel will be capable of a fair amount of work, and is unlikely to go wrong ; at the same time, trypanosomes will be so rarely found in his blood that, as long as the camels are kept away from bad tabanus "zones," he will be negligible as a "reservoir."

In spite of everything that has been said, "tryp" camels are so difficult to deal with that no efforts in prevention should be spared.

Prevention on the march into new country.—It is to be hoped that this will become necessary on several fronts. There are just three facts to impress :—

(a) If nothing is known of the fly-zones in the country ahead, a competent man should be with the first line transport to survey for tabanus and report. Immense loss could be saved in this manner.

(b) Tabanus sleeps at night. Unavoidable "bad" places can be negotiated at night without loss. (*N.B.* The tse-tse, *Glossina pallidipes* of East Africa, is more active at night than in the day.)

(c) Before the war, there were indications in East Africa that dosing with arsenic against trypanosomiasis might have preventive value. It is to be hoped that some one will get to work with tests in the field on this most important point and get results, one way or the other, to satisfy scientific critics.

One last word with regard to camel trypanosomiasis. It is frequently stated by those of superficial experience that trypanosomiasis does no harm to a camel if he is not worked. This is utterly and disastrously wrong.

Opportunity permitting, in future articles a brief survey of the camel's infective and "sporadic" diseases and of his parasites will be attempted ; and a short description of his lamenesses, fractures and other injuries, with their treatment, of the poisonous plants he is liable to eat and their effects, and of any other matter likely to be useful to veterinarians finding themselves in charge of unfamiliar patients in the shape of camels.

(To be continued.)

IMPETIGO.

By GEORGE GAIR, M.R.C.V.S.

Cononbrige.

WHILE accompanying the Medical Officer of Health for this county in his inspection of local public schools, a considerable number of the pupils were found affected with Impetigo Contagiosa. Some scrapings were taken from the affected skin surfaces of the children. I made smears of these scales by pressing them between two glass slides, and stained with carbol thionine blue and Gram. Large masses of micrococci were found (staphylococci) which retained their stain with Gram's method. They showed well with carbol thionine blue. The organisms grew well on agar at 37° C. and pure cultures were obtained. Impetigo is a non-febrile contagious skin disease peculiar to school children, although adults are sometimes affected. The disease in children is characterised by the formation of pustules on different parts of the body, particularly the face and hands. No itching exists, and the pustules are followed later by thick, soft, honey-like crusts. The disease is highly contagious, and is not uncommon in schools and similar institutions where large numbers of children congregate. They rapidly pass the disease one to another. Several writers refer to this disease in horses, dogs, and swine; but in no instance could I find any mention of an organism being the cause of the infection. Some of the writers allude to infectious impetigo developing during such diseases as distemper, strangles, swine fever, hog cholera, and rinderpest. The organism usually found in the human subject is the staphylococcus aureus, and possibly the *s. albus*. Occasionally a streptococcus has been found, but I have not obtained any form of the streptococcus in the human subject. Some authorities describe impetigo as including all eruptions characterised by large pus blisters (exanthema, which occurs in dogs after suppurating mange, Canadian horsepox, swine fever and cattle fever); but, again, no mention is made of a causative organism.

Another disease which closely resembles impetigo is pemphigus contagiosus of warmer climates; European children are more prone to it than native children in the tropics. The native adult rarely contracts it. Sir P. Manson obtained a diplococcus in these cases from the epidermis and fluids of the blisters. Having made no cultivation of the organism, he consequently could not say whether or not the organism discovered was responsible for the disease.

The organism obtained from the crusts of the school children was a spherical coccus 0.75 μ to 1 μ in diameter. It appeared in the direct examination from the crusts or scales as a grape cluster-like mass. It

grows at room temperature or blood heat, causes turbidity in broth, gelatine begins to liquefy whenever growth appears. In stab cultures liquefaction extended all along the culture, the colour turning orange-yellow. On blood agar and ordinary agar a thick growth appears, at first pale in colour, but ultimately becoming golden-yellow. The organism is like the *staphylococcus pyogenes aureus*. The surface of the body seems to be the natural habitat of this organism. When this organism is rubbed into the skin local inflammation follows, with small pustules (*impetigo*). A feebly virulent variety of the *s. pyogenes* is frequently found on the skin (*staphylococcus epidermis albus*). Welsh found it deeply buried in the epidermis, rendering it difficult to destroy by means of disinfectants. It can be differentiated from the *s. pyogenes aureus*, which ferments manuite, with production of gas, while the *s. epidermis* has no such action. I have found the *staphylococcus* in *impetigo* of young dogs. It also is Gram positive, and grows well on agar.

While the human and canine forms of *impetigo* are evidently caused by a staphylococcal infection, and at times probably by a streptococcus, it would be interesting to know the nature of the causative organism in *impetigo* in the horse and other animals.

DISTOMATOSIS, LIVER ROT, OR FLUKE IN SHEEP.

By G. MAYALL, M.R.C.V.S.

THIS disease is caused by two parasites called distomes (flukes), the one a large one—*distomum hepaticum*—and the other a small one—*distomum lanceolatum*. Both parasites are leaf-shaped, broad in the middle part, and with suckers at the anterior ends, and they attack the liver and bile ducts of sheep affected. The sheep when grazing take up the encysted form of the fluke which is present in the body of a snail (*limnæa truncatula* in this country; *physa tropica* according to Mr. J. Gilchrist, M.A., in South Africa); they may also swallow it in the cercarial form in contaminated drinking water.

A short history of the life cycle of the fluke makes the method of contracting and spreading of the disease by the sheep understandable. The flukes in an affected sheep lay eggs; these eggs are voided in the fæces on to the pasture or bare land, and are carried to water by wind, rain, insects, and feet of animals. The egg develops and becomes ciliated in the water, and after forming into a creeping larva enters the body of a snail, where it produces other larvæ by budding. The larvæ progress, and developing into a further stage, when they are known as cercariæ, they leave the body of the snail

and swim about in the water. They then re-enter the body of the mollusc and encyst themselves there and form pupæ. The mollusc, when taken up by the sheep, protects the pupa during its passage into the sheep's stomach; gastric juice dissolves the mollusc, liberates the pupa, and it gains access to the liver by its duct. In this way, partly by spending a period of their life-cycle outside the sheep, and partly by dwelling in the animal as their host, flukes grow in numbers and flourish.

SYMPTOMS OF FLUKE DISEASE.

A moderate invasion of the sheep by flukes may cause little loss of condition. In a great number of cases sheep show no symptoms of the complaint until a month or two after infection. There may be slight fever, weakness and loss of appetite, and later on some pain on pressure over the liver region. The mucous membranes become pale, and later on puffy and swollen conjunctivæ may be seen. Appetite fails, rumination ceases, the wool becomes dry and brittle, swellings appear along the trachea, brisket, and on the abdominal wall, and a microscopical examination of the droppings may disclose large numbers of fluke eggs. Owing to abdominal dropsy the condition known as "pot belly" arises. Emaciation increases, anæmia and cachexia develop, diarrhoea and great thirst frequently occur, and the animal dies of exhaustion.

OCCURRENCE OF THE DISEASE.

The parasite occurs in marshy pasture everywhere, and wherever sheep graze in such places they are liable to become attacked. In Southern Europe after wet summers the disease is very prevalent—France, Britain, Australia, South Africa, Japan, Hungary, Poland, and Slavonia have all suffered economic losses from severe outbreaks of the fluke disease. The ravages caused by the parasite were known in Europe as far back as 1547, and in 1881 Mr. A. P. Thomas investigated the disease in this country, gave us a proper understanding of it, and recorded his observations in the *Journal of the Royal Agricultural Society*. It has been calculated that 1,000,000 sheep per year die of the complaint in these Isles. In the year 1879 it decimated our flocks, causing disastrous losses. In the East and West of England, Wales, and in the Midland Counties it is of annual occurrence, and is well known to the flock masters and shepherds.

Treatment.—Notwithstanding the widespread prevalence of the disease, little investigation and research have been conducted into the medicinal treatment of the malady. The cause of the complaint and the life history of the enemy parasite have been quite plainly understood for many years. The chief direct remedial measures

adopted hitherto have been doses of salt, sulphate of iron, and gentian. These, by toning up the constitution of the stronger and lesser infected sheep, have enabled them to weather the bad time caused by the invasion of the parasite. The drugs, however, have never been asserted to have the power of killing the flukes in the liver. It has generally been assumed that a medicinal remedy strong and active enough to do this would kill the sheep also.

The great losses occasioned by liver flukes have called for years for scientific investigation and research in the adoption of remedial measures. The summons from an economic and agricultural point of view has been as urgent as it well could be, but the driving power at the back of the majority of the various Governments concerned has not been insistent, and strong enough to make them move. It has been left to the French Government to initiate a systematic investigation into the medicinal treatment of the disease and to adopt a successful remedy against it. The drug used not only drives out the parasite, but kills it in its abode within the liver of the sheep. Messieurs A. Railliet, G. Moussu, and A. Henry conducted the French experiments. Preliminary dosage with ethereal extract of male shield fern on five sheep gave gratifying results, and four further subjects for trial were procured. All these animals had been treated a month previously with various drugs without success. Their droppings always contained an abundance of fluke eggs. Each sheep received per day, on four consecutive days, a dose of 5 grammes of ethereal extract of male fern in 25 cubic centimetres of non-purgative oil (equivalent to 70 minims of the extract in 7 drachms of olive or linseed oil). All four sheep were slaughtered four days after administration of the first dose.

No. 1 sheep weighed 46 lb., and when slaughtered the liver contained no more than a single large fluke, but the organ was markedly cirrhotic, showing that the disappearance of the parasites was of recent date. The bile appeared normal.

No. 2 sheep weighed 66 lb. Two fully-developed large flukes were found alive in the bile ducts, and three adult dead ones. The hepatic lesions were healing; the bile had a normal appearance.

No. 3 sheep weighed 70 lb. The liver contained 26 large flukes, living, and one dead. The bile almost normal.

No. 4 sheep weighed 46 lb. Liver little affected, showing only one large fluke, which was still alive. Bile normal.

A fifth sheep kept as a check and not dosed weighed 64 lb. When slaughtered the liver was found to be greatly cirrhotic, *and contained 296 very lively large flukes.* The bile was of a brownish colour. In

all these animals the bile ducts contained a small number of young living flukes.

It is recommended to dose the animals in the morning, two hours before feeding.

The actual price of the remedy in France is 65 francs for 1.43 lb. of the ethereal extract of male fern; the cost of each dose of 5 or 6 grammes works out approximately at 35 to 40 centimes—i.e., for four doses for one sheep at 1 franc 40 or 1 franc 60, plus 15 centimes for the oil.

Messrs. Gignoux Bros. & Co., of Decines, near Lyons, are specialist manufacturers of ethereal extract of male fern. Their preparation is always of standard strength, which ensures its efficacy of action. It is guaranteed to contain 24 to 25 per cent. of filicine and a minimum of 3.50 per cent. of filicic acid.

Up to the time of the discovery of the treatment of fluke disease by ethereal extract of male fern there was no drug that would kill the flukes *in vivo* in the interior of the liver. It is important that the ether used in preparing the extract be pure, and the absolute root of the aspidium filix be employed. The preparation of Messieurs Gignoux Bros. answers all tests.

TETANUS BACILLUS AND ITS MICROBIAN ASSOCIATES.

BY T. M. INGLIS, M.R.C.V.S.

For/ar.

THREE years ago a Clydesdale gelding about eight years old, and belonging to a farmer, received a punctured wound in the sole of the hind hoof and immediately over the pedal joint. The wound was the result of a gathered nail about three inches in length, and had existed nearly ten days before we were consulted. We found the wound highly septic, and a copious discharge of synovia coming from it, accompanied by severe lameness in the animal.

The subject was put in slings, and the wound rendered as free from sepsis as could possibly be done at one time. Although we always inject these cases with anti-tetanin, we resolved to use anti-toxin of a mixed character, as we considered the wound infection to be of this kind.

The patient was injected with anti-suppurin, and the local treatment was continued daily with ablutions of warm creolin solution, and the foot wrapped in an antiseptic poultice.

The anti-toxin was injected on the fourth day afterwards, and then every five days until seven doses were given. After the first injection we observed an alteration in the wound and an increase in the discharge, but towards the fifth day this had diminished considerably. Encouraged so far with the treatment, we continued on the same lines.

After fourteen days we found the wound doing remarkably well, discharge getting much less, and lameness greatly improved. On visiting this case some days later we were greatly annoyed to find symptoms of tetanus exhibited, which became well marked by next day. We cannot say we have confidence in the curative principles of anti-tetanin, but as a prophylactic we cannot recollect a single case of disease after its use—it may have been that the disease had been modified to such a degree by the anti-toxin that it was not recognised. We therefore do not as a rule use the anti-tetanin when the symptoms are fully established.

In the case referred to we continued our treatment with anti-suppurin. The patient remained in the same state for over ten days or so; then we observed the symptoms to be less severe, and on every subsequent visit we found the improvement maintained until the subject made a complete recovery with the exception of a slight stiffness in the region of the pedal joint, which has now disappeared. Although we cannot possibly establish any particular theory with a single case, still this one in practice conveys to my mind that an accidental wound to the foot of a horse is in every case a cause for simultaneous intervention in the wound of the tetanus bacilli and different kinds of micrococci which play an important part in the infection.

The question arises to me: Do we do enough by way of prophylaxis by injecting anti-tetanin alone? It is asserted by some authorities that before the spores of the tetanus bacillus can germinate they must have microbial associates. I believe the tetanus bacilli are implanted in wounds usually in the form of spores, and the most vigorous local treatment of the wound itself is highly essential, but owing to their resistant power the spores are difficult to destroy. The reawakening of these dormant spores is the cause, according to authorities, of late tetanus so often met with in practice, thus demonstrating the necessity of a second dose of anti-toxin, as the effect of the first may have faded. It appears also essential to eliminate and prevent the growth of their associates before the tetanus bacillus has time to produce its toxin. It is believed that a wound may heal leaving spores intact; their reawakening may be the result of an introduction into the part of bacteria which are the usual associates of those of tetanus.

If these spores of tetanus are rendered powerless by destroying their associates, then it looks as if the proper method of treatment in the case of an accidental wound would be to assist in the formation of anti-toxins which the system of the patient is inadequately manufacturing, not only to defend against the products of the tetanus bacilli but also those of their microbial associates.

Associates of virulent organisms with a design for mischief are to my mind similar to the associates of men of doubtful character, and where these are observed together, it is almost certain their purpose is of a bad character and creates an impression that they are evilly disposed.

Pathogenic organisms apparently have associations, and I am convinced they carry out their designs by assisting one another, and I am inclined to believe that if they are separated from their associates many may be rendered powerless. As I have already stated, I am not, favourably impressed with the usefulness of anti-tetanus as a curative, and consider it should not be relied upon if the symptoms are fully established. I understand, however, that some practitioners use it, and have confidence in it. I am inclined to the belief that our proper treatment is to attack the associates both locally and by vaccine, and render the habitat of the organisms less favourable to their germination and assist the defences against the invasion of their toxins.

I trust this attempt of mine will give rise to others giving their opinions and experiences on a very interesting subject in connection with a very troublesome disease.

STREPTOTRICHOSIS OR PSEUDO-ACTINOMYCOSIS IN MAN (PSEUDO-TUBERCULOSIS.)

By G. GAIR, M.R.C.V.S.

Cononbridge.

FROM different localities reports have, at intervals, been published describing unique cases of disease in man, produced by various bacteria belonging to the genus *Streptothrix*. These results have been found in abscess of the brain, cerebro-spinal meningitis, pneumonia, and other pathological conditions.

In cases of human infection, described by Flexner, the pathological picture of the disease resembled so nearly tuberculosis in human beings that the two diseases could only be separated by the finding of the causative micro-organism in each case. A descriptive instance occurred recently in — Hospital, the patient, a man just past middle age, showing all the clinical symptoms of pulmonary tuberculosis.

The sputum in the case was copious, very tenacious and dark, almost like a prune juice example. At short intervals sputum from the patient was supplied to me by the medical attendant for examination for T.B., but invariably the examination failed to find any evidence of the bacilli of tuberculosis.

My attention was attracted by the presence of acid-fast, long wavy filaments while examining this material with Zeil Neilson's stain.

With Gram's stain, large numbers of the diplo-cocci of pneumonia and the diplo-bacillus of Friedlander were also discovered.

The latter so predominated that pure cultures were obtained.

These two organisms were not, however, sufficiently abundant to account for the grave pathological changes occurring in the patient's lungs. The thread-like filament found in the stained sputum and cultures suggested the examination of the material for actinomycosis. Accordingly culturations were made on glycerine agar, blood serum, and potato. The cultures on the latter when fully developed had a very characteristic actinomycotic appearance, showing a dull grey, raised and wrinkled growth of considerable thickness, occasionally of a bright sulphur yellow or light chocolate colour, somewhat similar to the lichenous growth commonly seen on apple trees.

Stains were made of these growths, and were no doubt, as regards the nature of the disease (spreading by continuity) and the reason why infection was produced, undistinguishable anatomically from tuberculosis; the patient suffered from "streptotrichosis" and not from tuberculosis. The disease in man somewhat closely resembled that observed in animals—there is less tendency to localisation or to abundant formation of connective tissue. The tendency of the disease in man is to become chronic. The disease spreads by continuity and the tissue seems unable to resist its invasion; besides, secondary embolic foci may occur, perhaps the commonest seat in man being the liver.

The filaments from the cultures in the case were well seen, as they usually are from cultures. They measure about 0.5μ . across, and are usually of great length. The central protoplasm is enclosed in a sheath—in older filaments this protoplasm becomes broken into coccoid bodies giving the appearance of strepto-cocci; the cocci may break out from the sheaths. These bodies are regarded as gonidia, the clubs are involution forms, perhaps produced by the resistance of the tissues. When pus secretions or teased specimens from human sources are stained by Gram's method, the filaments and the gonidia; are Gram positive, while the clubs situated around the periphery and showing a radiating structure do not usually stain by Gram's method. With carbol fuchsin and picric acid, the fungus stains red and the tissues yellow. In the bovine organism, the clubs stain well with Gram's method, the hominis variety being stunted; in the hominic variety also the prominent central filamentous network, which is usually well developed in actinomycosis of the human subject, is generally replaced by a mass of debris in the bovine type.

The dichotomous branching of the individual filaments enclosing the protoplasm in the case showed very marked and distinct branching,

and these again showed the same branching habit ; numerous polymorphonuclear cells as well as hyaline and mononuclear cells were present. Some of them contained portions of the filaments within them.

Actinomycosis or ray-fungus has exhibited a variety of infections due to different species of streptothrix, instead of being (as formerly believed) a single disease entity caused by a single micro-organism (*actinomycosis bovis*). Some accordingly substitute the name "Streptotrichosis" for "Actinomycosis." Several pulmonary cases of streptotrichosis have been reported, wherein the physical findings could not be distinguished from those of tuberculosis.

The sputum and pus from cavities of the lungs in these cases contained branched threads which were as acid-fast as tubercle bacilli. Various investigators have described several varieties of streptothrix, as the cause of pulmonary infection. *Leptothrix buccalis* is a common non-pathogenic organism of the mouth, and belongs to the fission-fungi type. It frequently appears in the sputums in pulmonary gangrene and is known as "*Leptothrix pulmonalis*."

It is differentiated from the streptothrix because of its non-branching, hence the name "*Leptothrix*." It also takes on a violet or bluish colour when treated with Lugol's solution. The student should especially observe the possibility of streptothrix infection, or he cannot appreciate the importance of these slender threads with or without branching, and may consider them accidental bacilli or varieties of leptothrix or other non-pathogenic fungi.

The lungs seem to be the seat of the primary infection in most cases of human streptothrix disease.

All cases therefore presenting the physical signs of tuberculosis, wherein repeated examinations fail to find the bacilli of tuberculosis, should be systematically examined for threads of streptothrix.

Streptotrichosis may affect the mouth, neck, lungs, skin, kidneys, conjunctiva, appendix and peritoneum in man. Cases show a preponderance of males, and the influence of occupation and other circumstances involving special exposure to the possibility of infection from a vegetable source is very noticeable.

Eppinger's streptothrix belongs to Group II of the streptothrices—a class possessing acid-fast properties, and showing more active pathogenic properties than the freely growing species of Group III.

Apparently the presence of streptothrix Eppinger causes a pulmonary infection which may not be distinguished anatomically from tuberculosis.

The branching developments occasionally found in the bacilli of tuberculosis is sometimes in typical actinomyces form, and this

peculiarity suggests that it should be placed among the trichomycetes. Foulerton, in his Milroy Lectures (1910), says "There can be no reasonable doubt that at one stage of its growth the bacillus of Koch is represented by branching mycelial threads of this streptothrix type."

The fact being so, the common "bacillary" forms represent the persistent rod segments of a streptothrix. The fungi are probably seldom transmitted directly from one animal to another. The fungus is common on such cereals as barley; it is also found on grasses. Among the reputed bacilli which display acid-fast properties to a marked degree are those having the characteristics of a streptothrix—e.g., bacillus Phlei (Timothy grass), cow dung bacilli. They are found on grasses.

Infection in the human subject may result from inhalation during threshing, or by chewing raw grain. Pathologically the granuloma (the term is becoming obsolete) is first composed of lymphocytes; polymorphonuclear leucocytes then appear, and giant cells are not infrequent. In the central parts are clumps of the ray fungus.

Considerable fibrous tissue often surrounds the granuloma; softening subsequently occurs. Formation of pus and sinus formation follow. The condition of the pus is characteristic and one can hardly overlook its serous or viscid nature, and the golden yellow colours of the parasites present in either case. The fibrous thickening around the granuloma may be mistaken for a sarcoma. Much remains to be done in regard to the study of the higher bacteria which are pathogenic to man and animals.

The trichomycetes form a group between the schizomycetes, or bacteria proper, and the myxomycetes, or moulds. Some confusion exists as to the terminology of the class. The streptothrix group of micro-organisms, while having many affinities with the bacteria, differ from them in many important aspects which link them with the fungi. They develop from spore-like bodies into cylindrical dichotomously branching threads which grow into colonies. The appearance would suggest a mass of radiating filaments. These higher bacteria may rightly be considered, according to their development, as a transition group between the simple bacteria and the more highly developing fungi.

Certain organisms which resemble moulds and bacteria having branching filamentous-forms, and at the same time having a spore-like method of reproduction, are known under the name *Streptothrix*, or better, *Nocardia*. It is chiefly in various pathological conditions of the lungs that they are observed, although they have been found in the brain, kidney, glands, etc.

These infections are most likely to be confused with phthisis and

glanders. Their cultivation is easy, and their staining reactions are midway between T.B. and actinomycosis. In cultivation of fungi it may be well to remember that moulds grow well on media with an acid reaction. If therefore reaction is +2 per cent. or even higher it favours the growth of fungi, and at the same time inhibits the development of bacteria.

Moulds are sometimes treated with 60 per cent. of alcohol for one or two hours previous to placing them on the media to destroy bacteria. This treatment does not injure the mould.

In this case the condition of the patient became gradually worse, pleuritic effusion developed, and thoracentesis had to be performed. Nothing abnormal was found in the fluid withdrawn when examined microscopically. Shortly after, however, when another such operation was performed a further examination of the fluid was made, and cultures were put on agar, when a mixed infection of *staphylococcus pyogenes aureus*, *citreus*, and *albus* was obtained. Death followed soon afterwards. These cases are almost all fatal. On account of the obscure nature of the disease in man it is seldom that the character of the disease is recognised during life. The clinical symptoms in man, and also in animals experimentally inoculated with *streptothrix*, so resemble those of miliary tuberculosis that the question is naturally suggested whether there are really not more of these cases than the few reported as pseudo-tuberculosis would indicate. It is now recognised that the universal prevalence of genuine tuberculosis has so long occupied our attention that much is taken for granted, and cases in which symptoms and lesions resembling very closely tuberculosis may easily be put down to the credit of the tubercle bacilli.

The following classification serves as an attempt at differentiation of streptotrichosis:—

- (1) *Leptothrix* is characterised by its lack of observed branching, non-wavy growth, stiff, straight threads, in which division seldom (or never) occurs.
- (2) *Cladothrix*. By its false branching, rapid fragmentation; the filaments are long, sometimes a millimetre in length. The cultures have a strong mould smell.
- (3) *Streptothrix* or *Nocardia*. True and abundant branching, wavy growth, later fragmentation and formation of Conidia, rounded bodies regarded as spores.
- (4) *Actinomycosis*. True branching; characterised by the radiating, wreath-like forms which it alone produces in the living body.

Clinical Case.

UTERINE SEPTICÆMIA (SUBACUTE), ENDOCARDITIS IN MARES.

By R. HUDSON, F.R.C.V.S.,

Retford.

During the period of the last fifteen years I have met with five cases of endocarditis in mares with profuse vegetations on all the valves of the heart.

After the first two I awoke to the fact that it was perhaps common to mares, and probably of uterine origin, for in one case I found it after metritis, and in some of the others there was a history of abortion, while the remainder had no history of trouble, though they had bred recently.

The animals affected have all been shires, and varied in age from three to about fourteen years.

The first case I saw presented a perfect picture of a case of purpura-hæmorrhagica. She was an aged mare, suckling a strong foal about four months old, had been running at grass since foaling, and did not seem to ail anything until a few days before. She now showed the following symptoms: Pulse weak, about 70 per minute; temperature, 103; breathing slightly quickened; head, muzzle, and eyelids tumefied; mucous membranes infected; petechiæ; legs greatly swollen, and oozing blood-stained serum. Anterior chamber of the eye was dropsical, containing red-coloured fluid, and the lower part of abdomen presented a ridged swelling, pitting on pressure. The mare died the day following; the heart showing vegetations on the valves and the tissues infiltration. The womb was not examined.

Case 2.—I was called to foal this mare. It was a breach presentation and a bad one. Laminitis followed, from which the mare was making a good recovery. She was turned away, and on being shepherded one day, about two months after foaling, she was found with bad colic pains. I found her dead on arrival. *Post-mortem* examination showed vegetations on the heart valves and plugging of the vessels of the cœliac axis.

Case 3.—Had no past history, foal dead, mare worked until she showed difficulty in breathing and could not keep up to her work. Examination showed the mare in good condition; she was a beautiful mare with a coat like satin. Pulse weak, jugular pulse very marked, mucous membrane of eye pale-blue tinted veins prominent, mucous membrane mouth pale-bluish, vagina pale, showed petechiæ. Heart sounds weak, indistinct and irregular. Mare was shot, and *post-mortem* examination showed similar lesions to 1 and 2.

Case 4.—An aged mare. Had been treated for a bad cold. Too weak to work, though in fairly good condition. Examination showed general depression, legs swollen, mucous membrane of eyes pale, and veins prominent, pulse fast, soft, irregular; temperature 102, jugular pulse, thin, colourless discharge from nostrils, cough, respiration not increased when at rest, petechiæ in mouth and vagina, heart sounds indistinct. Slaughtered. *Post-mortem* examination showed vegetations on heart valves.

Case 5.—Three-year-old filly, had aborted some four or five weeks before. She was at work, and when seen by me was blowing hard; temperature, 105; pulse, fast, irregular and soft; heart sounds indistinct; petechiæ showing in mouth and vagina. No swellings. Died three or four days after first seeing her. I did not make a *post-mortem* examination

I think the disease originates in the womb, either from retention of some portion of foetal membrane or fluid at the time of parturition, septic changes taking place and infecting the blood, though they may be so gradual as not to induce any illness at the time. One often sees and hears of mares which have a discharge from the vagina for some considerable time after foaling. Sometimes the os uteri closes up before the discharge is got rid of, leading to an accumulation of pus which may require removal many months after parturition. So it is possible for septic changes to take place in the womb without serious evidence of trouble there, such as may be overlooked by the owner or not thought of sufficient importance to need our attention.

I have noticed that more mares have irregular pulses than horses. With the exception of *Case 2*, none showed any disease of the womb, but this may be accounted for by the fact that sufficient time had elapsed for it to regain its normal condition.

Treatment is useless, but something might be done for its prevention by not treating lightly cases of abortion, retained membranes, and persistent uterine discharge.

Translation.

THE PRESENT WAR AND THE SPREAD OF PARASITIC DISEASES IN MEN AND ANIMALS.

BY PROFESSOR GALLI VALERIO,

Director of the Institute of Hygiene and Parasitology of the University of Lausanne.

The present war, which has mobilised millions of men, and which brings men and animals together from all parts of Europe, has provided an extraordinarily favourable milieu for the spread of infectious diseases, as well in the warring States as in neutral countries. The

spread of these diseases is favoured by the abnormal relations under which at present the soldiers, the civil population, and the animals have to live. One knows, indeed, the great influence which the numerous predisposing moments exercise in the spread of infectious diseases, while they weaken the defensive forces of the system against the causative factor of infection. Clinical observation and animal experiment have shown us, unmistakably that immunity, even if we suppose it well established, may be overcome, while the individual ability to resist disease diminishes. The disease (K) may be, in fact, understood as resulting from the two components, virulence of the causative organism of the disease (V) and the resistance of the system to disease (R). It stands in direct relation to the first, and in inverse ratio to the second $K = \frac{V}{R}$ (B. Galli Valerio, "Immunity and Resistance in all Maladies," Milan, 1897).

But now consider all elements favourable to the origin of infection in the present War. On the one hand, it is supported by massed bodies of men and animals, by lack of cleanliness, soiling, and impurities of the earth, water and nutriment, by sickness and disease, and by apparently cured subjects it may be insidiously conveyed. On the other hand, the power of resistance of the body is considerably weakened under the influence of overstrain, insufficient nourishment, and moral and psychic shocks.

Under these circumstances new diseases can break out, or ailments previously present in the system and in the latent stage may take a quick and severe course. On all these grounds epidemics and epizootics may break out at any moment in the fighting as well as in the neutral countries. One may not cherish the thought that the epidemics of to-day occur with less violence than in former times. The history of the last epidemics of plague, cholera, spotted typhus and pox show us that these diseases, if they break out among a debilitated people, and under conditions in which the energetic regulations of modern hygiene are difficult to apply, produce the like devastations as in earlier centuries. It suffices to recollect the devastations due to the plague in India, cholera in the first Balkan war, and spotted typhus in the present war in Serbia. It must not be forgotten at present that outbreaks of infectious diseases in a country that has not known the particular malady for a long period of years may assume an especially violent form. Thus it has been seen that spotted typhus, conveyed into Germany by Russian prisoners, occurs in much severer form among the Germans than among the Russians. It may be shown, further, that different infectious diseases, brought about by varied stocks of one and the same organism, may differ greatly in their

virulence. So also a disease which already exists in a country may assume a very severe form by conveyance of the causative organism over its borders from another region.

It is, perhaps, useful to indicate here a few of the most important diseases of men and animals which may occur here in Switzerland in the course of the present war, either as isolated outbreaks or as epidemics.

I limit myself only to those forms of disease that can be transmitted directly or indirectly from man to man or from animal to animal. I notice also such diseases as may be observed in interned or imported animals, but which in Switzerland do not find the necessary conditions of life for further spread. I will group the different diseases according to their actiology, and at the same time mention those which may occur exclusively in man or animals, or both together. If I encroach here on the diseases of animals this is done not only for the reason that different ailments affecting them are transmissible to man, but also because at present they cause great economic losses, and so indirectly exercise a great influence on the nourishment of man, and, as a result, also on his health.

Measures against these old and new diseases, which the present war might introduce into Switzerland, must therefore comprise the employment of the strictest hygienic regulations to strengthen the resisting power of single individuals, and to combat the causal organism of infection and anything that may contribute to its further spread.

I will summarise shortly the general lines of precaution to be adopted.

(1) Strict carrying out of the hygienic regulations with regard to the mode of living of both men and animals (ventilation, lighting, careful collection and removal of dejecta and rubbish, cleanliness of the dwellings, stairs and passages, camping places, and courts and yards). One can never impress sufficiently how dangerous spitting on the ground is, and what bad results accrue from unclean and badly built privies and latrines.

(2) Strict hygiene of towns (removal of rubbish and excrement of men and animals, control of drinking water). The attention of the authorities must be specially given at this time to the drinking water. One must first of all get rid of the prejudice that in spring water supply the diseases which are transmitted through drinking water can no longer occur. Spring water is very often greatly contaminated by surface water. This the more so because the so-called spring water is very often nothing more than surface water which has only passed through a thin layer of soil. The more I see the more I am convinced that the settings and service are very often badly constructed, so that water occurring pure at the spring becomes contaminated in the course

of its further distribution and service. Before resorting to chemical and bacteriological analyses one should always have the settings and services tested by local inspection. Analyses should only be undertaken when one is satisfied that these technical points cannot be implicated in any way. Where it is not possible to obtain pure drinking water one must always fall back on purification measures. The chloride of lime method is recommended in these cases as being cheap and efficacious.

(3) Strict control of viands and drink. Nutriment and victuals of little value as regards quality weaken the system and produce a predisposition to disease. If they are contaminated with parasites they can themselves cause infection. Meal and flour play the double rôle in this connection, and milk and meat may do likewise. Through hyphomycetes tainted meal or flour not only has a disagreeable taste, but it may cause severe illness, *e.g.*, B. pellagra. Watered milk brings signs of mal-nutrition as a result, especially in young children. Contaminated milk and milk from sick animals may cause direct diseases (tuberculosis, typhus, diphtheria, foot and mouth disease, scarlet fever). The use of the flesh derived from sick cachectic animals can cause diseases (para-typhus, helminthiasis). In view of the great rise in price of meat, we cannot altogether exclude the flesh of infected animals, except that of cachectic subjects, from consumption, but we must take all precautions to protect the consumer from infection by the different sterilising processes (refrigeration, cooking or steaming, and salting). The over-keen destruction of tuberculous meat, as practised in many a place before the war, was, from a hygienic standpoint, more to be deplored than welcomed. There was the fear of a wholly hypothetical danger to a section of our nation in nourishing themselves on this class of meat which must have as a result a decrease of the natural ability to resist infection. In legislating against adulterations fines, in my view, do not suffice. In repeated cases the best way is to publish the names of the delinquents. This system, where it has been adopted, has produced gratifying results.

(4) Cleanliness of the body and clothing. Dirtiness of person and attire favours the development of a whole rank of parasites. Among these are hyphomycetes, which cause ringworm, scab mites (acarina), the different kinds of lice of men and animals (hoematopinus). These parasites can not only cause severe symptoms in themselves, some among them serve as intermediate hosts for a number of very dangerous infective organisms. Through lice, for example, recurrent fever (spirochætosis) and spotted typhus may be transmitted and spread abroad. To the care of the body attention should also be directed to the village house and shop accommodation; cheap, well planned and

suitable structures can be provided. In schools the cleanliness of the children should be supervised: lice occur too frequently among them. At the present time we ought to insist more than ever on the cleanliness of domesticated animals. Not only on account of the high price, which ought to act as an incentive to keep the animals in as good a state of health as possible, but also because ringworm and scab which attack the animals may also be transferred from them to man.

(5) Repression and destruction of the arthropods which develop outside or in dwellings, and which directly or indirectly can exert an injurious influence on men and animals. Great cleanliness of dwelling places plays a very important rôle in the war against bugs, fleas, papatici (phlebotomus, a blood sucking fly), and flies. To combat the fly pest one should attack their larvæ directly, and also protect food beforehand from contact with flies. Of great importance also is the war against gnats, and not solely because of their annoying attributes. In Switzerland we have three species of anopheles which are implicated in the transmission of human malaria (*A. maculipennis*, *bifurcatus*, *nigripes*). Since we also have many malaria carriers among the interned, so through both these agencies we can have malaria zones in our country similar to those that have been noted in certain regions of France and in Flanders. On the contrary, it is little credible that malady zones will be caused by the filaria of man, although among the interned it is highly probable that carriers of these thread worms may be found. One must also wage war against ticks, which, in the different diseases caused through piroplasms in animals, act as intermediate hosts.

(6) One must therefore proceed to discover as early as possible all individuals who are attacked by infectious diseases or become continued harbourers of pathogenic organisms, in order to isolate them and subject them to energetic treatment. In this connection one must be very strict as regards notification of infectious diseases, as well on the part of the doctor as the veterinary surgeon. In the army it is of the greatest importance to seek out venereal disease. Hand in hand with this precaution must go the control of prostitution as well as the distribution of protective salves or composts to men. We do not forget that soldiers infected in the service may infect their families, and so produce further centres of venereal diseases.

(7) Provision of isolation pavilions of roomy and wide structures capable of easy disinfection. Above all, handy disinfecting apparatus for jets of steam should be provided. These utensils are relatively cheap now, and can be worked by every man without any special knowledge. In order that disinfection can be thoroughly carried out, it is necessary that a specially formed body of men should deal with this matter.

(8) Inoculations against all diseases, as well in men as animals, in regard to which effective inoculation has been decided. Against certain diseases regular carrying out of inoculations (pox, symptomatic anthrax), against others on the outbreak of epidemics (bubonic plague, swine fever, etc.). Of the highest value for the troops also are the present poly-valent vaccines which at the same time protect against typhus, paratyphus, cholera, etc. All these precautions must go hand in hand with intensive hygienic enlightenment of the population, be it by schools of instruction, conferences, or the wide circulation of pamphlets.

Modern hygiene under the present difficult circumstances, as well as at the height of her strenuous task, has proved stable and strong.—
Swiss Veterinary Journal G. M.

Review.

DISEASES OF THE DOG AND THEIR TREATMENT. By Dr. Georg Muller, of Dresden, and Dr. Alex Glass, A.M.V.S. (McGill), Professor of Canine Medicine in the Veterinary Department, University of Pennsylvania; pp. 506, illustrations in text 492, full-page plates 16. Price 25s. net. Publishers: Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, London, W.C.

This is the fourth edition of this book, which has been enlarged, revised and amended by Professor Alex Glass. It is a comprehensive work, and perhaps the most profuse one on the ailments of the dog that we have in the English language. There are full sections on the general examination of the dog to decide between health and illness, the organic diseases, constitutional diseases, chief conditions indicating surgical treatment, diseases of the eyes, ears and skin, and special chapters on black tongue (canine typhus), *uncinaria canina* (hookworm), and serum therapy, with special reference to its use in distemper. We agree with the authors in their conclusion that up to the present time "it cannot be said that any serums or vaccines for distemper have been proven to be of scientific value."

There is much in the volume that can be read with pleasure and profit, and all men interested in the advance of canine medicine and surgery ought to possess it. Some good tips can be obtained from a careful perusal of its pages, and little fault can be found with most of the deductions of the authors. At the same time we think that many really knowledgeable canine practitioners will find much in the work to criticise. The more books we read on canine diseases the more we become convinced that, despite the Britisher's self-depreciatory attitude as regards canine ailments and treatment, the best veterinarians among us can teach other nations something about dog diseases and their treatment, and personally we would still have no hesitation in claiming the very front rank for some of our countrymen in this branch of veterinary science.

The weakest point in the book in our opinion is that of the illustrations. Fig. 28 on page 67 conveys nothing enlightening to the

discerning eye. It might be that of a nervous dog, one spoilt by its owner, or one in perfect health, and certainly it shows nothing pictorial as to the worst stages of intestinal obstruction in the dog. The illustration at page 69 is quite out of date. Any veterinary surgeon who administers enemas to dogs in this fashion at the present day has mistaken his vocation. The stern of the dog will be like that of a ship in distress, and the operator, if paid by time, will have a good thing on. The illustration facing page 136 might answer with a china dog off a mantelpiece, but we doubt its practicability with one of flesh and blood. Fig. 82, page 194, is old fashioned and non-explanatory, and the part protruded looks more like a sausage than a bladder.

The bandaging up of a dog with fracture, as illustrated in Fig. 105, is quite unnecessary, and there are grave objections to leaving a bandage on for, say, six weeks or less, in the position indicated on page 350. We write this after experience of about 200 cases of fractured limbs in the dog, with a high average of cures. For years we have preferred using a wire *écraseur* to a hooked forceps for the holding of protruded *membrana nictitans* before cutting it off in the dog. The advantages of its use are obvious. The muzzle illustrated in Fig. 158 might do on a patient, docile animal, but we can see it soon becoming relegated to the "great unknown" by some of the ailing subjects we get.

If any veterinary surgeon acted as illustrated in Fig. 100 with a dog having tetanus we should return a verdict of culpable homicide if we were called in to act on the jury at his death.

Now as to a few statements made in the text. On page 279 we find the following remarkable observation: "The use of agents for reducing the temperature (in distemper) is objectionable, as they not only deprive us of the symptom of temperature, which is of the greatest importance during the course of the disease, but cause more or less depression of the heart." Not to mention agents that reduce fever without depressing the heart, we think any veterinary surgeon who does not take the temperature of a dog suspected of distemper, before he gives it any medicinal agents at all, is negligent. The number of dogs we have treated successfully for distemper with *sodæ hyposulph.* and *liquor ammon. acet.*, puts the tin hat on this argument. Apart from this draconic statement we have nothing but praise for the pages on distemper. We find no mention of some clinical facts in examining dogs suspected of tuberculosis. In two out of ten cases we have diagnosed we found tubercles on the palate and pharynx, and we think a careful examination ought always to be made of these regions, and gradual emaciation and unthriftiness ought to be taken into account also. The usefulness of the ophthalmic test in suspected cases is quite rightly given due prominence by the authors.

A grave omission in a work on the diseases of the dog is lack of any reference to interdigital cysts. We find none in this book.

On page 325 we note calcium phosphate given in a prescription for rickets. Now the best men know that this salt of lime is not assimilable by the dog—chloro-phosphate of lime is the right preparation to use.

The publishers have done their part of the work in their usual first-class style.—G. M.



WILLIAM SHIPLEY, F.R.C.V.S.



JAMES FERGUSON SIMPSON, J.P., F.R.C.V.S.

Biography.

WILLIAM SHIPLEY, F.R.C.V.S.

By the death of Mr. William Shipley, F.R.C.V.S., our profession loses one of its best and brightest ornaments, and East Anglia a practitioner who was right in the front rank as a man and a veterinary surgeon. As a man Mr. Shipley was straight, genial, generous, and broad-minded; no narrowness or pettiness ever pervaded his outlook on professional matters, and he was equally at home in the intricacies of town practice or in the strain and difficulties of carrying on veterinary work and duties in the country and among agricultural clients. To meet him was a pleasure, and to know him was an education. The son of a man whose name was a household word in veterinary circles in East Anglia, he succeeded in adding fresh laurels and lustre to the name he inherited by the life he led and the work he did. For sixteen years he was an active and earnest member of our Council, and did valuable work therein both in committee and in open deliberation and debate. He graduated in 1888, took his fellowship degree in 1893, became a member of Council in 1901, and was Vice-President from 1906 to 1910. He was a member of the Chamber of Agriculture for Norfolk; whilst as Secretary and Treasurer of the Victoria Veterinary Benevolent Fund his yeoman and pioneer work is known to all of us. He held many offices as inspector to Horse Show Societies in Norfolk and Suffolk, he was an inspector to the Board of Agriculture, and also acted as Veterinary Inspector at the Royal Show and at Islington on various occasions. He was President of the National Veterinary Association in 1907, and those of us who attended the meeting at Yarmouth will never forget the right royal way in which the thing was done. Mr. Shipley had held all the posts at different times in the E.C.V.M.A. He was ever a friend to his professional brothers and a willing helper to them in any difficulties. To the poor stockowner he was generous and helpful, and he found time in his spare moments to inaugurate such a useful institution as a local Pig Club, which enabled poor men to insure their pigs.

The fine and valuable life of the subject of our memoir has been cut off all too soon. To his wife and son (Capt. William Shipley, M.R.C.V.S.) we extend our deep sympathy. Of Mr. William Shipley it may be truly written that he was never weary in well doing; he worked nobly and climbed well, and early in life understood the importance of "hitching his waggon to a star."

G.M.

JAMES FERGUSON SIMPSON, J.P., F.R.C.V.S.

THE death of Mr. James Simpson has taken from us a man whose unflinching loyalty to our profession left many landmarks behind. President of the Royal College of Veterinary Surgeons in 1895-96, Vice-President and Member of Council for many years, Mr. Simpson was ever to the fore when good work was to be done for veterinary science, and it was largely owing to his unsparing effort that the Army Veterinary Corps occupies the high position it now holds. His time, energy and money, were never refused when asked for, and his hospitality as a host on numerous occasions when President of local Veterinary Societies was unbounded. At the National Veterinary Association he was a regular attendant and a prominent speaker.

In the Maidenhead district of Berkshire he was held in the highest respect, being elected Mayor of the Borough for 1891-92, and acting on the Town Council for many years. He was a Justice of the Peace and the Senior Magistrate of the Borough, his judgments being recognised as always just and fair.

Although of late years incapacitated through illness from taking active part in any professional or business affairs, his presence will be much missed, for his name had become a household word in the profession. Mrs. Simpson had predeceased him by a few months, and he leaves a son, Major Percy Simpson, A.V.C., at present the Commanding Officer of a veterinary hospital, actively engaged in the service of his country.

PUBLISHER'S NOTE.

The Australian Supplement MSS., due to appear in the January issue, was unfortunately lost on the *S.S. Arabia*. A duplicate copy of the Manuscript has now safely reached us and the supplement will be published in the April issue.

NOTICES.

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THE
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GLADSTONE MAYALL M.R.C.V.S.

APRIL, 1917.

Editorial.

GLANDERS AND THE BRITISH ARMY. VALUE OF THE
ARMY VETERINARY SERVICE

GLANDERS, that scourge of horseflesh, *the* disease (without exception) which has in all past wars where horses were employed been considered to be the most dangerous and most dreaded, is practically non-existent in the British cavalry, artillery, and transport horses in France.

For this, if for nothing else, the Army Veterinary Service can legitimately be stated to have justified its existence ; and it can claim not only to have saved the country many millions of pounds and to have enabled the operations of war to be carried on in a manner which would otherwise have been impossible, but also to have saved many human lives as well. Everyone knows that Glanders is contagious from horses to men, and that to the latter, when infected, it means certain death.

Hundreds of thousands of horses, gathered from all parts of the world and in almost every instance from countries where Glanders is rife, are now employed in the British Area along, and for several months the returns have been almost *nil*. To be able to substantiate such a statement is a great triumph, and the organisers of the regulations and the methods which have brought about such a successful state of affairs deserve the warmest possible congratulations.

Those of us who have had intimate contact with Glanders in London and other large cities in the pre-mallein days know full well the devastation which a few undetected cases of this disease can cause in a large stud of horses in peace time; but in a war like this the chances of infection—had glanders not been under control—both to horses and to men would be increased a thousand-fold.

For an idea as to how serious a disease it is considered in Great Britain one has only to read the stringent laws and regulations of the Board of Agriculture or the London County Council on this subject and to study their returns. In Great Britain about 8,000 horses were destroyed for this disease alone between 1886 and 1890; whilst in France and Germany respectively, during the same period, in each country the total losses amounted to nearly 6,000 infected cases.*

In German territory there were officially notified, during the years 1886 to 1902, 12,780 horses as suffering from Glanders, and between 1876 and 1886 20,566 horses died of Glanders in Prussia alone, or were killed on account of having the disease. There were twenty known cases of the disease having been transmitted to man, three of the victims being veterinary surgeons.

In Saxony, a travelling circus was proved to have infected seventeen localities within the space of two years—a further proof, if any were needed, of the great watchfulness necessary, and the need for proper skilled veterinary supervision in all our mounted units, which must of necessity move from one area to another and occupy billets just vacated by other mounted units.

Between 1877 and 1887, 3317 were officially reported as glandered in Austria; and in Hungary in 1897—8, 2459 in one year alone; the statistics gave 1700. The above figures illustrate the prevalence of this dire disease in peace time, but in war time its ravages have always been greater, *i.e.* before the wonderful uses of mallein were discovered; and now, in the greatest and most terrible war the world has ever known, its ravages are readily controlled and its disastrous effects made practically non-existent.

For this result alone—even if there was nothing to place alongside it—the organisers of the British Veterinary Service can be said to have “done their bit”; and it is to them and to the loyal co-operation of their colleagues, the British Veterinary Officers, that this is due. They have justified their existence as a useful unit in “the contemptible little army.”

Mallein, used by the skilled veterinarian with proper judgment and discretion, has saved the British taxpayer millions of pounds, and what would have happened to our horses without its aid in a war

* These statistics are taken from Friedberger & Frohners' *Veterinary Pathology*.

like that in which we are now engaged, and without the professional knowledge and skill of the Army Veterinary Service, is too terrible to contemplate.

ARE WE DOING OUR BEST ?

THE Army Veterinary Department is again compelled to advertise the fact that more Officers are needed to enable its branch of the Service to be satisfactorily carried on ; and it can be taken as pretty well assured that the request for more volunteers would not have been made had they not been needed badly. To the thinking man the question which at once flashes across one's mind is whether or not in the first place the profession has come forward sufficiently well to be considered to have done its duty ; and, secondly, whether the Officers at present in the Army are having their services utilised to the best advantage. As regards the former, we have, according to the Register, about 3,300 qualified veterinary surgeons.

Out of these the following are the figures which demonstrate the approximate numbers of Veterinary Officers actually serving.

Regular A.V.C.	182
Retired A.V.C. now temporarily employed	9
Special Reserve	87
Indian Civil	5
Territorial	283
Temporary Commissions	519
	<hr/>
	1,085

Taking the number actually on the Register at 3,030, this leaves a balance of some 2,215 members of the profession not yet enrolled.

One must not omit to mention that there are quite a substantial number of Canadian and Australian graduates whose help to the Corps is much appreciated, but even with the help of graduates from our Colonies we are still short.

It is for us to think how those 2,215 men are otherwise employed, and what can be the reason that they do not join up. Some are voluntarily stopping at home to set their principals free ; some are over military age ; and the patriotic ones in these categories are helping in war work of one kind or another, perhaps looking after a Remount Depot or a Military Hospital in the capacity of civilian practitioner.

Suppose we put those who are over age or incapacitated from accident or illness at one half of those remaining, this still leaves about 1,100 to account for—where are they ? Until compulsory service is enforced there are some who will not budge. Established in

comfortable practices and getting fresh clients every day owing to the lack of competition, they grow fat in flesh and pocket, and towns and districts are still to be found, of moderate size only, in Great Britain and Ireland, where there are two or even three practitioners, whereas one alone could "carry on."

Wherein does the fault lie? When England needs them none should stand aside, and lessons in this respect might well be taken from our Continental Allies. The time is ripe for a definite mobilisation of the profession, and if we do not, in this respect, set our own house in order, the whole matter will be taken out of our hands and relegated to powers whose compulsory claims will *have* to be attended to in a far different and more irksome manner than at present. To the civilian the war is always irksome, but we have no option here, for the foe we have to deal with is relentless, and to keep from under his heel it is absolutely necessary that everyone shall do his bit. Let us each ask ourselves the question and answer it conscientiously—"are we doing our bit?"

Original Communications.

THE MAINTENANCE REQUIREMENTS OF HORSES AND THE THERMIC AND DYNAMIC VALUES OF THEIR FOOD-STUFFS.

By R. G. LINTON, M.R.C.V.S.

Professor of Hygiene, The Royal (Dick) Veterinary College, Edinburgh.

To estimate, even within a wide range of latitude, the amount of energy expended daily by working horses is a matter of some speculation; the reasons for the uncertainty of the estimate are so sufficiently obvious as not to need detailing.

If one were to calculate the number of foot-tons of energy expended daily by a stud of horses and thereon to formulate a feeding standard for the guidance of the stable-manager, the error involved might be considerable in either direction. The intelligent stable foreman, with a full experience of the food required by his charges for the work they do, adjusts their rations until he finds that his mature horses are in a condition of weight stasis; his horses once in flesh remain so, and effectively do the work required of them.

It may happen, and without question frequently does, that the ration fixed upon by the horse-keeper fails to supply enough energy for the daily requirements; if under these conditions the veterinary adviser is asked to adjust the dietary, he must estimate to the best of his ability the daily energy expenditure, and increase the supply of nutrients until a satisfactory ration is found. Having done so he is in a position to calculate with some accuracy the daily energy output, and the information then at hand may be used for a future

occasion under similar working conditions, and in the same locality, as the basis on which to form other diets. This knowledge of the energy requirements has thus been obtained empirically, and is the result of experience, and the information is more to be depended upon than the knowledge presumed by guessing the amount of work done, expressing it in terms of "light," "medium," or "heavy" work, and allotting to each class an expenditure of a fixed number of foot-tons of energy, and for which an amount of nutrients is supplied according to the class in which the horses are placed.

To guess the quantity of energy expended, and it can never be anything else than a guess, and thereby calculate the daily ration, is to court disaster unless the object in so doing is merely to form a basal diet, subject to such adjustment as may be seen necessary.

For economical reasons it is at times advisable to effect a change in the composition of the diet, and if the present ration provides sufficient energy, and in every way satisfies the tenets of dietetics, it would obviously be foolish to effect a substitution which would materially alter its energy value. It is well known that full advantage is not taken of the economical possibilities of substitutional dieting. This is due to some extent to prejudice, but largely to unsatisfactory results brought about by effecting substitution without paying due regard to the real value of the food-stuffs used.

In order to adjust a faulty ration, or to effect a substitution in one already correct, a clear conception must be held as to the energy values of the food-stuffs given to horses. Failure to duly appreciate the energy requirements of horses and the distinctive values of the nutrients used is bound to lead to false adjustment and all that pertains to the error.

That some confusion of thought exists among those responsible for fixing the rations of horses, as to the energy values of foods and their application, is known, and the object here is to attempt to remove this confusion and suggest values for the more common food-stuffs which enter into horses' rations.

In order to make clear what follows, it may not be out of place to discuss briefly the forms of energy and their application.

Every food-stuff contains an amount of latent energy, the total quantity of which can be liberated on combustion and measured in terms of heat if burned in a calorimeter. This is the *energy of combustion* or *chemical energy*. The whole of this heat or energy is not, however, available for body usage, as a certain portion of it is lost owing to the liberation of incompletely oxidised gases, the formation of urea, and as undigested portions in the form of fæces. The chemical energy is therefore described as *potential energy*, since it exists in possibility and not in actuality. The energy in a food-stuff,

less the losses just mentioned, is available for distinctive purposes in the body, hence it is termed *available or metabolisable energy* (1). This total available energy has primarily a call made upon it for the energy expended during the processes of digestion and assimilation; whereby, incidentally, heat is evolved which serves to make good that lost by radiation and evaporation. Whatever energy remains after deducting these losses is *net energy*, and is available in the first place for carrying on the vital functions. Thus, the first call upon a food is for maintenance purposes, for the maintenance of heat and for the maintenance of vital physiological functions. It will be obvious that a food-stuff may have a high combustion value and be able to supply sufficient heat to the body, but, at the same time, it may not yield sufficient net energy to satisfy functional calls; such is the case with wheat straw, and the ultimate end of an animal fed exclusively on such a ration would be death by starvation.

If there is any surplus net energy over that required by the body for maintenance it will be available for productive purposes, such as the formation of fat, the secretion of milk, or for the exhibition of external work, as in hauling a load.

The value of a food for maintenance is reckoned as the heat value of the metabolisable nutrients; its value is essentially thermic, and a ration for maintenance calculated on its thermic value would be efficient provided that it contains a sufficiency of available heat units and enough net energy for functional purposes. Nutrients given for purely productive purposes (dynamic) have a value which depends upon their response to the purpose for which they are given, and will have a lower value than if given for maintenance purposes, since a portion will, in the case of the former, have to be deducted for the energy expended on digestion, but this deducted portion (thermic) may be placed to the credit of the maintenance portion of the ration, from which an equal amount may be removed.

The whole of the net energy given for the purpose of work production is not, however, expressed in full value as visible work, because when increased muscular action takes place, as in drawing a load or in similar work, there is an increase of metabolism, and part of the nutrients given with the idea of them being converted into visible work must go to make good the losses incurred thereby. The percentage of energy expressed as work naturally varies with the character of the work and the conditions under which it is done; but, as a general rule, it is considered that two-thirds is absorbed during the conversion of stored kinetic energy* into visible work.

* The term "potential" is also applied to the stored kinetic energy; thus, of the stored or potential energy only one-third becomes converted into kinetic energy for external work.

For a correct estimation of the nutrient values of food-stuffs it is necessary to express the nutrients in terms of their heat-producing power for maintenance, and in some other term for "production." For the latter purpose the production of bodily increase or the formation of fat is used.

By reducing the digestible nutrients in a food-stuff to a common term, the heat-producing value and the fat-formation value of which are known, it is possible not only to compare one food-stuff with another for either or both of the purposes stated, but it is also possible to estimate how much thermic energy would be available, or how much fat could be formed from any quantity of a food if the digestibility of its nutrients are known for the animal for which the calculations are to be made.

As the result of many years of work, Kellner (2) and his associates have calculated the fat production capabilities of a large number of food-stuffs for oxen and expressed these in terms of digestible starch for fat production. The result of Kellner's work is embodied in what is known as Kellner's Starch Equivalent Theory.

While this theory has lately been criticised and fully discussed by Wood and Yule (3), by Murray (4), and by Halnan (5), it is possible that their writings have not been at the hand of the busy practitioner, therefore it may be convenient to briefly discuss the method of estimating the thermic energy of a food and Kellner's method of ascertaining the starch equivalent of foods for fat production.

It is well known that the amount of heat evolved on combustion of a substance depends upon the amount of oxygen it requires for complete oxidation. Thus fat will yield the most heat, protein less, starch still less, and amides least of all. Thus it has been found that:—

1 part of starch requires for complete combustion 1·12 parts oxygen.

1	„	protein	„	„	„	1·77	„	„
1	„	fat	„	„	„	2·9	„	„
1	„	amides	„	„	„	·6	„	„

Since, however, all of this potential energy is not convertible into kinetic form, owing to the losses already mentioned, it is considered that the heat value of these nutrients in the body is as follows:

1	part of starch (digestible carbohydrate and digestible fibre)	1
1	„ digestible true protein	1·25
1	„ digestible fat	2·3
1	„ amides (completely oxidisable)	·6

If, then, the amounts of the nutrients which are digestible in a food are multiplied by their factors they will be reduced to terms of equality and of digestible starch. The sum of the total equalised

nutrients contained in a given weight of the food-stuff can be expressed in comparable terms with an equal weight of starch for heat-producing purposes, *i.e.*, in terms of thermic energy. Furthermore, not only can a given weight of any food-stuff be compared with starch for thermic purposes, but a given weight of one food-stuff can be compared with any other and the two with starch for the same purpose.

Assuming that the digestible nutrients of 100 lb. oats are: True protein, 7 lb.; amides, 2 lb.; fat, 3 lb.; carbohydrate, 44 lb.; and crude fibre, 3 lb., the formula to reduce oats to its thermic or maintenance starch equivalent will be:—

$$(7 \times 1.25) + (2 \times 0.6) + (3 \times 2.3) + (44 \times 1) + (3 \times 1) = 64.$$

One hundred pounds of this given sample of oats, containing the amount of digestible nutrients as stated, has, therefore, a heat value of 64, compared with a heat value of 100, which is contained in 100 lb. digestible starch. Therefore, 64 is the maintenance starch equivalent of oats.

If, then, we know the heat value in terms of calories, or any other heat unit, of a given weight of digestible starch, we are able to compute the heat value in like terms of a given weight of oats or any other food the digestibility of which is known. Further, if we know the daily loss of heat from a resting animal expressed in the same term of heat unit, we are able to calculate the weight of any food which must be given daily to make up for this wastage. It is therefore possible, with the aid of Rubner's law (6), to estimate the daily thermic energy expressed in terms of M.S.E. which will be required for a horse of any weight.

Production Value.—Kellner (2) found that if pure nutrients were added in a finely divided form to a basal ration they formed fat as follows:—

1 kilogramme of protein formed 235 grammes of fat.

1 „ starch „ 248 „ „

1 „ fat „ 474 to 598 grammes of fat.

Taking starch as unity, the factors to reduce the other nutrients to the same term are:—

True protein	..	..	..	..	0.94
Starch	..	..	..	..	1.00
Fat	..	..	..	..	1.9 to 2.4

The factor 2.4 is used for the fat contained in oilcakes, 2.2 for grains, and 1.9 for the fat in coarse fodder, such as hay and straw, since the value of the fat decreases the more it is surrounded with fibre. On testing the applicability of these factors it was found, in the case of concentrated food, such as cotton seed cake meal, linseed cake meal, etc., that they held true, and the digestible nutrients of the

food-stuffs formed fat to the same amount as if pure nutrients had been given. On the other hand, it was found that with hay and straw there was a considerable decrease in the fat formed from that as calculated ; so that, as Kellner points out, if the digestible nutrients of hays, straws, and other coarse foods are reduced to terms of productive starch and the sum of the converted nutrients is credited with its apparent value, a grave error will be committed by giving to these foods a productive value they do not possess ; therefore, a deduction must be made from the assumed production starch equivalent in order to bring it to its true level.

Kellner found that the response of a food for production became less as the difficulty of digestion increased ; and that the energy expended upon digestion depended upon the amount and character of the fibre present, the depression of the net value being largely due to this cause and to the fact that of those foods the digestion period of which is prolonged, putrefaction to some extent takes the place of true digestion.

In order to express this depression of the net value of foods, Kellner gave to each food-stuff a "value number," which indicates the net percentage available for production over that calculated by the formula. Thus, with concentrated foods containing little crude fibre, such as some oil-cake meals and maize, etc., little energy is expended on digestion processes, and to these are allotted full value, or 100. Oats has the value number of 95, wheat bran 77, and barley straw 46. While the difference between the M.S.E. and the P.S.E. when reckoned according to their respective formulæ is not great (an average of about 3 per cent.), the difference between them when Kellner's "value number" is reckoned on may or may not be considerable. Thus, for oats the calculated M.S.E. is 64, the calculated P.S.E. 60, and the net P.S.E. 58. For maize the calculated M.S.E. is 80, the calculated P.S.E. 77, and the net P.S.E. 77 (full value). Meadow hay has a calculated M.S.E. of 40, a calculated P.S.E. 38, and a net P.S.E. 23. It will therefore be clear that if for the small amount of concentrate (oats or other grain) included in the maintenance ration of horses no great error will be committed if the necessary amount is reckoned on its dynamic value, especially when allowance is made for variation in composition of the cereals and the variability of other dietetic factors. On the other hand, when the valuation of coarse fodders is under consideration a different view must be taken, because the difference between their thermic and dynamic values is great and because hay and straw are fed for maintenance purposes. Therefore their food values will be essentially thermic ; and to calculate the amount of hay necessary for maintenance on its lower dynamic

value would mean that some 87 per cent. more hay would be allowed than is required.

The need for a distinction between the thermic and dynamic values of nutrients is fully recognised by animal nutrition experts, and the formula utilised here for calculating the thermic energy is that used by Wood and Yule (3) in their statistical enquiry into the starch equivalent theory. Murray (7) having clearly defined the points at issue, has constructed tables of nutrients and allotted to them their respective thermic and dynamic values.

He has in addition taken certain horse dietaries and furnished from them examples of his method of ration construction. Murray, however, expresses the nutrient values in terms with which those who are most commonly employed in horse dieting may not be familiar, and it is questionable to what extent the busy practitioner will be prepared to change his method of working. Warrington also gives a table (8) showing the maintenance and production starch equivalents of a variety of food-stuffs, but for oxen and sheep only.

Kellner himself clearly emphasised the distinction between the two values, and stated the maintenance ration of oxen in terms of maintenance starch equivalent (the error in his appendix has been pointed out by Halnan) (5); but notwithstanding this he calculated both thermic and dynamic energy requirements of the horse in terms of production starch equivalent, and Woodruff (9) followed his example, and in so doing arrived at an erroneous conclusion as to the amount of nutriment necessary for a horse for maintenance purposes, as will be shown hereafter.

Though Kellner suggested that his production starch equivalents are in a general way applicable to the horse, it is certain that for a large number of food-stuffs, especially coarse fodders, the value as estimated for oxen will be too high for the horse, whose power of digesting coarse foods is considerably less than that of oxen. Therefore it may be supposed that a more correct assessment of both thermic and dynamic values will be obtained if the availability of the nutrients is calculated when allowance is made for lower digestibility co-efficients. The writer has, therefore, appended a list of digestibility co-efficients, by means of which the maintenance and production starch equivalents here suggested have been calculated. Where the digestibility is not known the co-efficients have been assumed from analogy, and the method by which these approximate figures have been obtained is in each instance explained. It is admitted that subsequent investigation may require these to be modified; but it is believed that utilising these assumed figures will give more accurate results, and, in any case, be theoretically more sound than if the digestibility of the

various foods by oxen be taken as in all cases applicable to the horse, which undoubtedly they are not.

The bracketed letters refer to the authority for the figures given. Thus: K=Kellner; H & M=Henry and Morrison; A = Assumed.

				DIGESTION CO-EFFICIENTS.			
Foodstuff.				Protein	Fat	Carbohydrate	Crude Fibre.
Oats	..	..	..	80	71	75	29 (K)
Maize	..	..	..	76	61	92	40 (K)
Barley	..	..	..	80	42	87	29*(K)
Beans	..	..	..	86	13	94	65 (K)
Peas	..	..	..	83	7	89	8? (K)
Bran	..	..	..	79	71	71	26 (A)
Dried Grains	..	..	..	71	71	60	26 (A)
Linseed Cake	..	..	..	82	53	96	— (K)
Carrots	..	..	..	99	—	94	— (K)
Meadow Hay (v. good)	..	..	..	63	22	65	48 (K)
Meadow Hay (medium)	..	..	..	58	18	58	39 (K)
Italian Rye Grass Hay	..	..	..	63	22	65	48 (A)
Red Clover Hay	..	..	..	56	29	63	37 (K)
Timothy Hay (American)	..	..	..	21	47	47	43(H & M)
Oat Straw	..	..	..	33	12	42	35 (A)

The co-efficients of digestibility of oat straw have been assumed in the following manner. The relation existing between the co-efficients of medium meadow hay for horses and for cattle have been applied to oat straw. Thus it is concluded that, taking the co-efficients of the nutrients as unity in the case of the ox, for the horse they will be: Protein, 1; fat, .33; carbohydrate, .9; and crude fibre, .65. Since the digestion of oats by oxen and by horses has been found to be similar there can be little error in considering that horses will digest bran equally as well as do cattle, and therefore the figures published by Kellner for cattle have been adopted here for the horse. For the digestibility of dried brewers' grains the co-efficients for oxen for the protein and carbohydrates, as shown by Kellner, have been applied to the horse, while those for fat and fibre have been given a lower value and taken to be similar to those of bran. As the percentage composition of Italian rye grass hay (Scotland)† is practically identical with that of very good meadow hay (Kellner), it is considered that the two will be equally digestible.

In order to determine the maintenance and production starch equivalents, the analyses of the various food-stuffs have been taken

* Assumed to be the same as oats.

† For the analysis of Italian rye grass hay, the writer is indebted to Dr. Lauder, of the Edinburgh and East of Scotland College of Agriculture.

from Kellner's list, since these differ little from those published in this country. The digestion co-efficients used are those stated above, and the factors for calculating the respective values are those previously mentioned. Where a more exact estimate of the nutrient value of a food is required, as in feeding experiments, it will, of course, be necessary to calculate the value of each sample on its analysis; but this being impossible in practice, an average valuation must be utilised, and it is believed that the values here given will be sufficiently near for practical purposes. As American Timothy hay figures in two of the rations given in this paper the starch equivalents have been calculated on the analysis of the hay, and the percentage digested as given by Henry and Morrison (10).

Foodstuff.	STARCH EQUIVALENTS.	
	M.S.E.	P.S.E.
Oats	64	58
Maize	80	77
Barley	69	66
Beans	76	66
Peas	71	63
Bran	59	42*
Dried Grains	60	45
Linseed Cake	75	64
Carrots	10	8
Meadow Hay (v. good)	45	30
Meadow Hay (medium)	40	23
Italian Rye Grass Hay..	45	30
Red Clover Hay ..	41	29
Timothy Hay (American)	39	23
Oat Straw	27	12

The amount of nutriment required by oxen for maintenance purposes has been settled at that which will yield some 10,800 Calories for an ox of 1,000 lb. live weight when calculated on M.S.E. (2), (3), (5). There still, however, seems to be some confusion of ideas as to the amount required by horses. This is largely due to the fact that Kellner expressed the maintenance requirements of horses in terms of his Production Starch Equivalent. He fixed the nutriment required on the result of three series of experiments, in two of which the animals were fed a mixed ration containing a large proportion of foods of a relatively high dynamic value. The rations were working rations containing a small proportion of coarse fodder. In the third experi-

* The opinion once held by many veterinary practitioners that wheat bran has little or no nutritive value can no longer be considered true, as there is abundant proof, both experimental and practical, that it has at least the P.S.E. here given.

ment of the series the diet was composed of meadow hay "in which in some cases straw and corn were added." He found in series (1) that 3254 g. of starch equivalent satisfied the maintenance requirements of 500 kilogramme horses; in series (2), 3364 g., and in the third series, where the rations consisted chiefly of coarse fodders, 3312 g., and he concludes that for 500 kg. horses 3.3 kg. of starch equivalent is required for maintenance purposes.

It is important here to note that Kellner meant "production starch equivalent" and, furthermore, production starch equivalent calculated for ruminants. It will be plain, when the rations here given are examined, that Kellner estimated the maintenance requirements on P.S.E. When estimating total rations for working purposes Kellner adds this 3.3 kg. to the amount of P.S.E. reckoned for work and expresses the whole as "starch equivalent," meaning P.S.E.

It will be profitable to examine closely the second and third series of Kellner's experiments (the first is similar to the second). The average weight of the horses in the second series was 953 lb. and they were fed the following ration:—

	P.S.E. (K)
94 kg. Hay	or 2.07 lb. forming .64
51 " Straw (oat ?)	" 1.12 " " .19
177 " Oats	" 3.90 " " 2.34
38 " Beans	" .84 " " .56
131 " Maize	" 2.88 " " 2.36
26 " Maize Cake	" .57 " " .42

Giving a total starch equivalent of . . . 6.51 lb.
which is equal to . . . 11,132 Calories.

For a horse weighing 1,000 lb. this will be:—

$$6.51 \times \sqrt[3]{\left(\frac{1000}{953}\right)^2} = 6.73 \text{ lb. P.S.E. (K) or 11,500 Calories.}$$

In the third series the ration is not stated, except that we are told that meadow hay was given along with, in some cases, straw and corn; Kellner also found in this series that 3.3 kg. of starch equivalent satisfied the requirements of 500 kg. horses. In his third test the rations were similar to those given in the other series, in so far as 3.3 kg. of P.S.E. were allowed per 500 kg. live weight and that the amount of nutriment satisfied the animals' demands. On the other hand, the diets were widely different, as they were composed chiefly of coarse fodders, and, though they yielded the same amount of dynamic energy expressed as production starch equivalent, it will be presently shown that for maintenance purposes there was a much larger quantity of available energy. Not being able to ascertain

the exact rations which Kellner used during his third test, we must compound one similar to his, and one which will give an identical production starch equivalent for horses weighing 953 lb.; such ration would be :—

				P.S.E. (K)
Meadow hay (good)	10 lb.	forming	3.1 lb.	
Oat straw	6 ..	..	1.0 ..	
Oats	4 ..	..	2.4 ..	

Total				6.5 lb. P.S.E.
Or				11,115 Calories.

We have here two rations each of the same production starch equivalent and consequently each of the same calorific value when this is reckoned on the P.S.E. But the dynamic value of a ration is no true guide of its maintenance worth unless the ration is composed almost exclusively of food-stuffs having a relatively high dynamic value. If they are formed, as they usually are, mainly of coarse fodders the real maintenance value will be much higher than one would be led to suppose. This will be made clear if we reduce the two rations to their maintenance or thermic value and express them both in terms of maintenance starch equivalent, as follows :—

				M.S.E.
Hay	2.07 lb.	forming	.83 lb.	
Oat straw	1.12 ..	..	.30 ..	
Oats	3.90 ..	..	2.50 ..	
Beans .. ..	.84 ..	..	.63 ..	
Maize	2.88 ..	..	2.30 ..	
Maize cake .. ..	.57 ..	..	.43 ..	(M.S.E. 7½ assumed)

Total				6.99 lb. M.S.E.
Or				11,970 Calories.

The second ration will then be :—

				M.S.E.
Hay	10 lb.	forming	4.0 lb.	
Oat straw	6 ..	..	1.6 ..	
Oats	4 ..	..	2.56 ..	

Total				8.16 lb. M.S.E.
Or				13,954 Calories.

If this ration had been composed entirely of meadow hay, as some of the rations in Kellner's third series were, a still larger quantity of fodder will have to have been given in order to put it on a level with the ration of the second series so far as production starch value

is concerned, and in consequence, instead of there being a difference of 2,000 Calories it will be still larger. It is difficult to see how Kellner obtained almost identical returns from two rations fed for maintenance purposes and having a thermic value difference of at least 2,000 Calories.

In 1912 Harold Woodruff (not Hiram Woodruff) published (9) a small manual on the feeding of horses for the guidance of horse owners, veterinary surgeons and students, and in it he refers to the estimates for maintenance given by well-known authorities, and reviews, in some detail, the work of Kellner. He takes as his standard maintenance requirements "an amount of food providing the equivalent of 6½ to 7 lb. of digestible starch" for a 1,000-lb. horse, meaning thereby production starch equivalent according to Kellner's theory. Woodruff then gives four rations calculated for the maintenance of 1,000-lb. horses and reckoned on a starch equivalent, but not Kellner's starch equivalent, for he makes use of an empirical factor in place of Kellner's "value number." It is true that the error in so doing is not great with the majority of foods, but it is considerable with such foods as bran and dried grains, to which Kellner ascribes a comparatively low value number. Of the four rations given, two may be examined in detail and reduced to their thermic and dynamic values.

No. 2—		M.S.E.	P.S.E.	P.S.E. (Woodruff.)
Hay (v. good)	10 lb. forming	4.5	or 3.0	or 3.21
Oat straw	.. 5 ..	1.4	.6	.53
Oats	.. 6 ..	3.8	3.5	3.6
Total		9.7	7.1	7.34 lb.
Or		16,587C.	12,141C.	12,551C.
No. 3—		M.S.E.	P.S.E.	P.S.E. (Woodruff.)
Hay (v. good)	10 lb. forming	4.5	or 3.0	or 3.21 lb.
Oat straw	.. 5 ..	1.4	.6	.53
Maize	.. 2 ..	1.6	1.5	1.61
Oats	.. 3 ..	1.9	1.7	1.8
Total		9.4	6.8	7.15 lb.
Or		16,071C.	11,628C.	12,226C.

From the above examination of Woodruff's rations it will be obvious that though he intended his suggested diets to have a maintenance value similar to the value prescribed by Kellner, he really failed to do so, and allows for a 1,000 lb. horse an amount of nutriment far in excess of what Kellner thought to be requisite.

Having pointed out that a greater amount of nutriment is required for the maintenance of horses than for cattle, owing to the more

restless nature of horses and to the fact that they require at least a modicum of exercise, Jordan (11) reviews the estimates of Zuntz, Grandeau and Wolff, and concludes that 6.6 lb. of digestible organic matter is required daily for a resting horse of 1,000 lb. He gives eight rations which he says will meet the requirements. Of these, Nos. 2 and 3 are utilised here for discussion:—

		M.S.E.	P.S.E.
(2) Timothy hay ..	10 lb. forming	3.9	or 2.3 lb.
Oats	5 „ „	3.2	2.9

Total	7.1	5.2 lb.
.. ..	12,141C.	8,892C.

		M.S.E.	P.S.E.
(3) Timothy hay ..	10 lb. forming	3.9	or 2.3
Maize	4 „ „	3.2	3.0

Total	7.1	5.3 lb.
Or	12,141C.	9,063C.

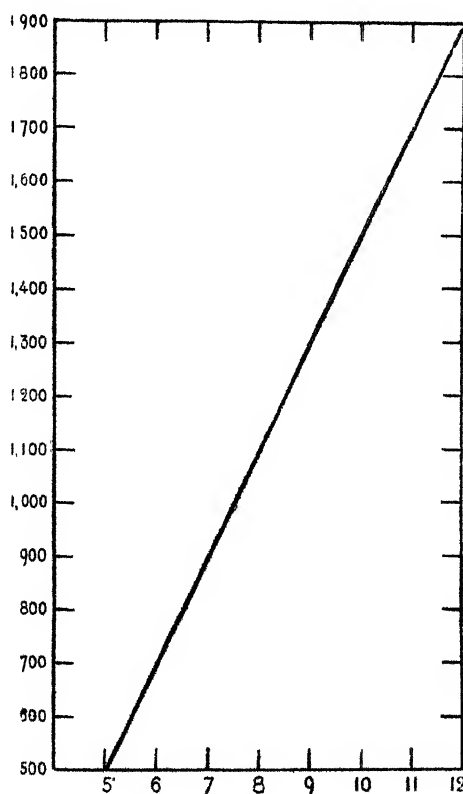
The thermic energy in Jordan's rations is, therefore, similar to the amount which Woodruff apparently thought he was prescribing.

Murray (7) holds that the energy maintenance requirements of the horse are the same as those of the cow for equal weights, but we know that horses require an additional amount for reasons already stated. Even so, Murray's estimate must be considered too high. His allowance is 35 kilo-pound-units, which is equivalent to 15,890 Calories. He apportions the maintenance ration of a 1,000 lb. horse as follows: .75 lb. protein and 8.3 lb. "starch." This corresponds to 15,683 Calories when the whole is reckoned as digestible starch.

Armsby (12) allows about 21 per cent. more energy for maintenance for horses than for cattle, so that, if we take Wood and Yule's estimate of 10,840 Calories M.S.E. for cattle, the allowance for a 1,000 lb. resting horse will be 13,116 Calories M.S.E. Finally, Warrington (8), referring to Zuntz, says that a horse of 1,100 lb. will require food supplying 12,000 Calories per day, equivalent to about 7 lb. of "digestible starch," and suggests as a ration which will meet these requirements, 10 lb. straw chaff (oat?) and 6½ lb. maize. This ration can be expressed as follows:—

		M.S.E.	P.S.E.	P.S.E. (Kellner.)
Oat straw ..	10 lb. forming	2.7	or 1.2	or 1.7 lb.
Maize	6.66 „	5.3	5.12	5.43
Total	8.0	6.32	7.13 lb.	
Or	13,680C.	10,807C.	12,192C.	

From a perusal of the foregoing one may conclude that the maintenance requirements of a horse of 1,000 lb. weight is approximately 13,000 Calories or 7.6 lb. maintenance starch equivalents, and that Woodruff's allowance of over 16,000 Calories is excessive. The accompanying graph shows the maintenance starch equivalent, calculated by surface law, for horses of various weights; it is so nearly a straight line that for practical purposes it may be regarded



as such. The thermic energy here suggested for maintenance should be sufficient for stabled horses or for working horses when the dynamic portion of the ration is adequate. To what extent it would be suitable for horses doing slow delivery work, with much standing, in towns in the winter months it is difficult to say. It will certainly not apply to horses under treatment for parasitic skin disease, where the loss of heat from the skin is materially increased by the application of varnish-like dressings. Neither will it be adequate for horses picketed in the open during a winter campaign.

To calculate a maintenance diet on production starch equivalent,

whether or not the maintenance requirements are expressed in terms of the same value, is misleading. With hard-working horses, where the coarse fodder is reduced to the optimum minimum, and the percentage difference between the thermic and dynamic values of the whole ration is small, the probable error will not be large. But where the maintenance ration consists chiefly of coarse fodder, a considerable over-estimation will be the result, and the animal will be given more food than is necessary. Furthermore, a diet would be prescribed which would not be given in practice; and farmers and horse-keepers, with an inclination to feed according to scientific teaching, would put on one side the starch equivalent theory; not only, as some do, because of its complexity, but also because it would not be found to tally with practical experience.

There is another serious drawback to estimating maintenance rations in terms of dynamic value. Having clearly defined to the student the distinctive values of both the thermic and dynamic energy obtainable from a food-stuff, it is inconsistent to utterly ignore the thermic portion when compounding a ration for either maintenance or working purposes.

Murray (4) objects to applying the term "Starch Equivalent" as used by Wood and Yule (3) for an essentially thermic ration, and says that confusion must result if the term "Starch Equivalent" be applied to essentially different things. We would, however, point out that no confusion can be worse than that which exists when production starch equivalent is used as by Woodruff; and that, as Halnan (5) has stated, the position is at once made clear when the two starch equivalents are calculated each on its own value. As he says, once it is realised that Kellner's starch equivalent means starch equivalent for production "there will exist no longer any danger of the student or scientific worker using the 'starch equivalent for production' of a food to express the 'maintenance starch equivalent.'"

REFERENCES.

- (1) "Principles of Animal Nutrition." H. P. Armsby. 1910.
- (2) "The Scientific Feeding of Animals." O. Kellner. English translation by W. Goodwin. 1913.
- (3) "Statistics of British Feeding Trials and the Starch Equivalent Theory." T. B. Wood and G. Udney Yule. *Journal of Agricultural Science*, Vol. 6, 1914, pp. 233-251.
- (4) "The Starch Equivalent Theory." J. A. Murray. *Journal of Agricultural Science*, Vol. 7, 1915, pp. 154-162.
- (5) "The Maintenance Ration of Oxen and the Starch Equivalent Theory." E. T. Halnan. *Journal of Agricultural Science*, Vol. 7, 1915, pp. 163-174.
- (6) "Zeitschrift für Biologie." Max Rubner. 1883. Vol. 19, pp. 535-562.
- (7) "Chemistry of Cattle Feeding and Dairying." J. A. Murray. 1914.
- (8) "Chemistry of the Farm." R. Warrington. 1909.
- (9) "The Economics of Feeding Horses." H. A. Woodruff. 1912.
- (10) "Feeds and Feeding." W. A. Henry and F. B. Morrison. 1916.
- (11) "The Feeding of Animals." W. H. Jordan. 1912.
- (12) "The Use of Energy Values in the Computation of Rations for Farm Animals." H. P. Armsby. *U.S. Department of Agricultural Bulletin*, 459, 1916.

REMARKS ON THE ÉCRASEUR IN PRACTICE.

BY T. M. INGLIS, J.P., M.R.C.V.S.

Forfar.

I noticed in the reports of the meeting of the North of Scotland Veterinary Society, held on August 26th, 1916, that some very interesting subjects were introduced for discussion.

One of these, the castration of colts, never fails to create interest at meetings in Scotland, and the practitioner does not exist who has not had some little reverse in his success with the operation.

Each practitioner has his own opinion as to the best method and instrument to use; he operates to have the best possible results, and naturally he adopts the mode he has found to be a success. Why should he practice any other method—unless he is of a progressive nature, and wishes to improve upon an old-fashioned system? I have no doubt many still use the cautery and caustic clamp, and if the colts do well, and they hear no complaints, I see no reason why the method should be changed, unless that both methods are easily adopted by the gelder, are troublesome, and do not look scientific. The heating of the irons is not always easily accomplished; the clamp method has its drawbacks in the removal of the instrument—this is best done by the practitioner, who cannot always find time to pay a second visit. When it is left to the owner or blacksmith, one is never sure of two things—sepsis, and adhesions.

I find the écraseur the favourite instrument amongst Scotch practitioners, and at the meeting referred to, if my memory serves me right, the discussion on mode of castration bears this out.

I was trained as a pupil to operating with the actual cautery but never liked its use; then when I took up practice here the caustic clamp was the method relied upon by most practitioners and clients. Many years ago I abandoned the clamp for the écraseur, and amidst a good deal of opposition succeeded in establishing the general use of the instrument.

I had no experience of the écraseur previous to that, and had a good deal to learn as years went on. I have now every confidence in it, and would never employ any other. Experience has taught me the better use of the instrument, how to keep it in good working order, and many little details which one finds essential if its use is to be a success.

First of all, the usual instrument is made too slender. I have had many instruments giving way at the anxious moment. These weak parts I have had strengthened in a specially made instrument.

The chain, always a source of worry, is often too fine, the link too firmly riveted—each link ought to have free movement. The chain

itself ought to have a sharp and a blunt side ; that is, the sharp edge should be filed off at the sides of the links on the one side. This blunt side I always use when castrating.

There is a difference of opinion about the slot in the instrument where the chain passes through. My own opinion is that the chain ought not to fit too tightly—every link should pass through freely. If it is tight it is more likely to cut instead of crush, especially if the edges of the slot are kept as sharp as the maker would like one to use it.

I know I have had less trouble from hæmorrhage since I saw to the easy movement of the chain links, and that the slot did not grip the chain too tight. I found this out when using an old "Farmer Miles" instrument with a fine chain, and extra large easy slot. When using this instrument I had no hæmorrhage, but one day a neighbouring practitioner who happened to witness its use advised me to get a new instrument—pointing out the large slot as a danger ; and being much younger and less experienced than my neighbour I took his advice, and had no end of trouble with the new instrument. I therefore made use of the older one, and once more I got peace in mind when operating. For a time I could not make out the difference, but later had the slot of the new instrument made easier, and the edge blunted, and together with a blunt side on the chain I had no further trouble, and have seen to this since.

During the season it sometimes happens that some days a number of colts will bleed one after the other, then the cases of hæmorrhage will suddenly cease. This appears without any apparent cause, but I am always inclined to believe it is due to one or more links becoming stiff in the chain ; hence the necessity of seeing to the chain being easy in its movement.

The *écraseur* is a very useful instrument in removing the testicles of the cryptorchid class of colts ; especially when one encounters a short cord, the instrument can be introduced into the canal or even abdomen, as is the case in the double ridgling, when, if one fails to get both from one wound, it often occurs that the near side testicle has been taken from the off side, and *vice versa*.

Last autumn I had presented to me a double schirrous cord for operation, and anyone who has experienced their removal with the *écraseur* knows the great risk one runs in the chain giving way. I adopted a new plan to avoid this, and removed both quite easily.

I may state, at the commencement of the operation one chain gave way on very little stress, and when I had another put on, with its sharp side to the tissue, I screwed it up quite tight, as tight as I thought was safe, then, with an assistant holding the tumour, I turned the whole instrument round twice or three times, which must have torn a

considerable amount of the tissue, because I was thus enabled to give the screw a few more turns until I found it too tight again. Then the instrument was turned again as before, and the process repeated with comparative ease.

Degive recommends passing a metal rod through the swelling after the écraseur has almost cut through the spermatic cord, turning that part of the cord within the chain once or twice around its long axis, and then completing the operation—this he terms “*tortion bornée*.”

When I meet with an extra long strong cord in an abdominal testicle I usually turn it on its axis several times before applying the chain, and with good results.

The instrument and chain ought to be attended to immediately one returns home, or sooner if at all possible, after the day's work. We always wash with soap, boiling water, and a little antiseptic in the water, then boil in a steriliser, dry with a prepared towel, then when warm apply a good dressing with antiseptic vaseline, making sure to work the links of the chain well with the dressing.

Some, I understand, “smoke” the chain by passing it several times through a flame—this may keep the chain, but the heat is likely to alter the links, and the chain to my mind is always too dry.

It is astonishing how careless some are with the place an écraseur is kept in after being sterilised. I have witnessed an instrument washed in a horse-trough after use at one place, and another animal to do in the neighbourhood, and without any further treatment—strange to say no bad results followed.

I once had occasion to be operating on a five-year old single cryptorchid, and the practitioner who employed me stated I would not require my écraseur, because he had a good one, and had had it thoroughly sterilised that morning. When it was presented to me I found it wrapped in the cloth that had been used all season, and a fine sight it was. I need scarcely state I made some excuse for not using this very good instrument of the newest pattern. When operating, especially with the écraseur, experience has taught the older practitioners not only to provide the necessary instruments for the operation, but also those necessary for any accident that may happen during its progress. It may be asked how is one to know anything will happen and what to be provided with.

It is always the most unlooked for thing that happens. Some years ago I was asked to operate on a two-year old with an abnormally large testicle on one side. I opened the sac, and found a large quantity of serum, and in the centre of it, to my astonishment, I found the urinary bladder, which I could trace right up to the pelvic cavity. Before I discovered the kind of abnormality presented I considered

it to be a cystic testicle, but on tapping it with a trocar the contents proved to be urine, which accounted for a flow of the same from the penis when handling that organ.

I broke down all adhesions, and got the bladder within the cavity, but, having a very long neck, it found its way back into its former position in a day or two. This animal gradually began to exhibit symptoms of danger, and it was obvious he would not recover. Mortification of the bladder had set in, and we destroyed him.

Another subject two years old, with a report that one testicle could easily be felt, but the other only occasionally. Thinking the case one of a single inguinal cryptorchid I had no hesitation in putting him on his back, and proceeded to get the retained testicle down into the scrotum, which I was certain I could feel in the canal. After pulling well on what I thought was a fairly well-developed testicle, and tightening the skin over it, I made a bold incision, and to my surprise a shower of blood went all over me. I kept a good grip with my left hand, and directed someone to hand me from my bag at my right two "Spencer Wells" forceps. These I applied to the mouth of the wound, and as far up as possible; then I had applied round both, and tied as tight as possible, a firm suture of ree fibre, and chanced leaving my hold of the part. The scrotum filled up quite tight, and I was rather anxious about the purse-string suture holding, but it kept its grip, and the animal was allowed to rise: the result was a good recovery, and I removed from the same side next season an abdominal testicle.

What I injured must be obvious to all, but the vessel must have been of a varicose nature and abnormally large. Had I not kept a firm grip with the left hand, which must have included a portion of the injured vessel, hæmorrhage would have been very difficult to arrest. It was also lucky I was provided with the instruments I used, and quite close to my right hand, otherwise I should have had a good deal of trouble. I always have with me a good supply of instruments and dressings when operating, and am sometimes asked what I require all these for, and I am only able to say "for what might happen." One has to adapt one's mind to circumstances which might be presented without any warning, and I once remember being asked by a neighbour to consult with him as to what ought to be done with a case of ventral hernia in a foal, the result of a kick from a horse. There was no external wound, but the muscles were ruptured and a wound about 6 ins. in length, and about 6 ins. below the point of the ilium. The injury had happened some hours before my arrival, and I found the bowels had worked their way out of the wound, and down beneath the skin as far as the umbilicus. We made an incision over the site of the wound, and by careful manipulation got the bowels returned within

the abdominal cavity. The internal wound now presented itself, and was very difficult to suture; the gut suture had to be of the thickest kind; otherwise when pulling the wound together the muscles came into action and the edges were likely to give way. We found a good deal of this gut was required, and at a glance we saw that our quantity was not sufficient. Being at our wits' end to know what to use, my neighbour suddenly exclaimed, whilst holding the wound, "What about clock gut?" and finding the owner had in his possession an old-fashioned clock it was suggested he at once remove one of the weights, and bring the gut. This was done, and we soaked the gut (which was anything but aseptic) in crude Jeye's fluid, then washed in clean warm water. Being faced with a failure if we delayed we risked using the gut, and a very suitable suture it made; so much stress being necessary to bring the parts together. The outer wound was tied in sections and very tight, similar to the method employed in the treatment of umbilical hernia. This case made an excellent recovery, and after the outer portion sloughed the part had almost healed. During the progress of recovery a serous abscess formed near the umbilicus, where the bowels had been. This was punctured with success.

These cases have all been recorded before, but I thought they would be useful when emphasising the necessity of being provided with more material and instruments than usually required at any operation.

I have no experience with any other instrument for castration than the *écraseur*, but have no doubt the others have been well tried and relied upon, but I have often seen instruments of different patterns in the instrument cases which have never been in use. The best instrument for the castration of bulls is undoubtedly the Italian instrument introduced first to the profession in this country by Mr. John Brown, F.R.C.V.S., of Invergordon. I first witnessed its use by my friend in 1913, and was somewhat shy in adopting it, but would never think of any other method now. It has many important advantages and one disadvantage which at times may be troublesome.

No wound is made in the skin. It matters little what you have been doing with your hands prior to operating, which is always a source of worry; the animals can be kept almost anywhere afterwards.

Although the cord is crushed, and the nerve supply to the testicle destroyed, it sometimes takes a few weeks for the testicle to disappear, and if the animal is exposed for sale too soon afterwards it may be thought by those inexperienced in the method that the animal has not been castrated. The owner, however, can always give a guarantee that the animal has been castrated, and will not leave stock.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.

(Continued from page 89.)

BY A. S. LEESE, M.R.C.V.S.

The infective diseases of the camel, other than trypanosomiasis, are collectively of far less importance than the disease named.

The camel is subject, under natural conditions, to anthrax, variola, tuberculosis, rabies, tetanus, botriomycosis, contagious microsis of the skin, and to a pleurisy and pericarditis caused apparently by an organism of the fowl-cholera type. "Influenza" is said to be a disease of camels by some observers; I must say that I know nothing about it, but I think the pneumonia of camels from four to six years of age is possibly a contagious one. There is also an unimportant catarrh in camels, which may be contagious. The anthrax-like disease seen in Indian camels and characterised by swelling about the throat is, I think, anthrax itself, but the blood does not always contain bacilli to be demonstrated; this is true of pig anthrax, too. Anthrax is found in camels in Somaliland and in Jubaland under the name of "Kud," and some forms of it precisely resemble these throat cases of India.

Camels do not suffer from either rinderpest or foot-and-mouth disease under natural conditions. Lingard claims to have caused a mild form of rinderpest in camels by inoculation; and I have tried to infect camels in various ways with foot-and-mouth, but with no success. The fact is that, in countries reeking with these diseases in cattle, the camels do not get them. Laboratory experiments mean little in the face of these facts. On several occasions outbreaks have been mentioned in reports, but they do not bear investigation. Glanders and strangles are not met with in camels. I believe it has been proved that the Bactrian camel can carry the bacterium of plagues.

Anthrax in camels takes a somewhat similar form as in horse and pig, with painful swellings about throat, base of neck, or body. Some of the throat cases, I feel sure, are local inoculated anthrax, probably *via* the punctures made by bots in the naso-pharynx; the swelling is sometimes enormous when the palatal expansion becomes involved. Certainly death may occur without septicæmia, and I have seen, and possess a photograph of, a case exactly resembling clinically that form of the disease which no one seems to see in Europe nowadays, described in text-books as "gloss-anthrax"; the camel was unable to close his mouth or eat owing to the size of his tongue; only one camel out of the three involved in the outbreak had this form, and he recovered from the "gloss-anthrax" but never regained his condition, and his tongue atrophied. As a good many cases do recover, a camel with anthrax should be given the chance.

It is interesting to note that the Somalis, by sheer tribal experience handed down from one generation to another, deal with anthrax as follows : The camel is kept in a small zariba by himself until he is dead, and then a huge thorn-bush defence is built over his body so that hyaenas and vultures cannot get at him until he is putrid.

Variola, or *Camel-pox*, is ordinarily a disease of young camels, usually very benign ; in fact, most of them go through it like children and the measles. Adults sometimes get it, and I have seen in working camels outbreaks involving over twenty head in every case ; but as a rule only a small percentage of a herd of adults exposed to contagion get the disease. In benign cases, lesions are confined to the lips. A malignant form, however, is sometimes met with, the lesions spreading over the head and, indeed, anywhere on the body, particularly where the skin is thin. Sometimes an eye is lost ; and camel-pox is occasionally fatal. The course is about three weeks, and the treatment of benign cases is handfeeding, or grazing only on plants free from thorns, and a daily application of boric vaseline to the lips. If the lips in this disease are allowed to get torn by thorns they swell enormously. A fact of practical importance in this disease is that it is liable to lose its benign character in the rainy season. Young camels are sometimes inoculated by their owners so as to get them through it before the rains. The malignant form seen in the rains sometimes finishes up in pyæmia.

Tuberculosis.—This disease is comparatively rare in India, but not uncommon in old camels at Cairo (Mason). It is not likely to be diagnosed very early, as trypanosomiasis will usually be suspected at first. Emaciation, irregular temperature and appetite are the chief indications. Cross has noticed persistent hæmaturia in one case. Tuberculosis of the camel is usually pulmonary, occasionally generalised. It is chiefly a disease of old camels.

Rabies.—Not infrequently met with in Asia in camels. Camels are peculiarly exposed to attack by rabid wild animals. Sometimes the affected camel is violently aggressive, and a rabid camel is then so dangerous that it is extremely important to see that any camel bitten by a rabid animal is *secured* during the necessary observation period. Some rabid camels are not aggressive, but noisy and terror-stricken, and I have seen a paralysis of the tongue in one case. The chief things for the veterinarian to do is (i) to see that any suspected camel is *secured* so that he can do no damage before a diagnosis is made ; (ii) to distinguish it from "mad staggers," a disease caused by indigestion, and in which all the movements are without purpose.

Tetanus is not common, but does occur occasionally as a result of infection through bites or sores ; no doubt, also, through shell-wounds. Only a minority recover. The disease sometimes prevents the camel from folding himself up in his usual sitting attitude.

Contagious Necrosis of the Skin.—This is met with in all camel-countries. It is inoculable; and, indeed, many of the lesions in affected camels are due to auto-inoculation—viz., rubbing a diseased surface of skin against a healthy one; thus, a camel with a lesion on his withers may inoculate himself on the poll by rubbing his withers with his poll; and a lesion behind the thigh frequently inoculates the skin over the gastrocnemius region, where they come in contact when sitting. Again, new lesions are apt to form wherever the discharge from current lesions runs down. The new pus from a lesion often appears to be an almost pure culture of streptococci; one may strongly suspect the presence of the bacillus of necrosis, but that remains to be proved. The skin only is involved in the necrosis. The lesions may be of any size, from that of a threepenny bit to that of the palm of the hand. At first there is a diffuse swelling, hot and painful; then the centre gets hard, dry, and black, the hair falling out. Gradually a line of demarcation forms around this hard, black centre, and then pressure on the latter will cause pus to break through in some part of the line. Later, the centre sloughs out like a "sitfast." In favourable cases the wound left heals without trouble; but sometimes there is a great tendency for the edge of the ulcer to become involved in the necrotic process, becoming, in its turn, hard, dry, and black; when this happens, the case is apt to prove rather troublesome. The lesions may occur on any part of the body; but they are rare where the skin is thin, and are seldom seen below knee or hock. Some camels have only one or two lesions, and then the constitutional disturbance is almost *nil*. Others have many lesions, and I have seen deaths from exhaustion, and also from pyæmia, due to them. On the whole it is not a severe disease, however, if the camel is in good condition to start with. Some camels when in poor condition seem to be unable to put up any resistance against the spread of the necrotic process. The disease when it occurs is a great nuisance; and sometimes a sore back becomes infected, and a huge slough results, which may lay the camel up for months.

In the treatment, when possible, affected camels should not only be segregated from the healthy, but also be isolated from one another at a distance of at least six yards. Dressers must have it impressed upon them that the pus in these cases can be inoculated, by the mere rubbing process they often so delight in, into the skin, and that the disease is spread this way. The discharge must be washed off the skin with carbolic soap, without any scrubbing; and all bits of tow used should be burnt or disposed of in a special bucket of disinfectant carried round by the dresser, and used for nothing else but their reception. The dresser should frequently wash and disinfect his hands and instruments, especially when going from one case to another.

The treatment may usefully begin with the administration of $1\frac{1}{2}$ or 2 lb. mag. sulph. if there are more than, say, four lesions.

Local treatment depends on the stage at which the veterinary surgeon first sees his case. If no line of demarcation and separation can be made out, the best treatment I have found to be the painting on of pure carbolic acid around and over the lesion; this may be done on three days running, but generally not more. It has undoubtedly the effect of stopping the outward (centrifugal) spread of the necrotic process, and attains the chief object of local treatment—*i.e.*, to cause the necrotic centre to be sloughed more quickly and neatly than if left alone. As soon as pus can be squeezed through the line of demarcation, one of the branches of a pair of strong dressing-forceps should be passed through the ruptured spot and under the black centre of the lesion; the latter can then be grasped by closing the forceps, and can often be separated quite easily; very often the necrotic piece of skin is removed in this way like a button. Experience has taught me that tearing makes a far better job than cutting; because the knife itself is apt to reinoculate the living tissues. If the dead piece cannot at once be completely separated, the best thing to do is to make drainage for the pus underneath it, and then carefully remove the pus; smear boric vaseline over the healthy skin below it, so as to prevent new lesions being formed there by the discharge; and paint carbolic acid (pure) over the part of the edge of the living tissue where the separation has not been completed. Usually, discharge of pus practically ceases when the necrosed piece is removed; up to that time the veterinary surgeon himself should superintend or do the dressing; afterwards, all that is necessary is a little dry dressing. When the edge of the ulcer shows signs of necrosis (becoming dry, hard, and black), the edge must, in its turn, be treated on the same principles as with the original lesion.

Hæmorrhagic Septicæmia (?).—Under this provisional heading I place a (practically) unimportant condition that I have met with twice, *viz.*, an inflammation of the serous membranes of the thorax, in which the clear exudate was found to be an almost pure culture of bacteria of the fowl-cholera type. Both camels were suffering from trypanosomiasis (Indian surra) as well, and were living with other camels which remained free of hæmorrhagic septicæmia. The cases were in separate herds. Hæmorrhagic septicæmia, chiefly, in India, affects water-buffaloes and cattle, and occurs in country subject to flooding, and at about the same season as Indian surra. Gaiger, in the course of an investigation of hæmorrhagic septicæmia, found that a camel could be inoculated with the bacterium and show no symptoms of disease; yet the bacterium could be isolated from his tissues if the

camel is killed a long time afterwards. It seems that the occurrence of my two cases may be explained in this way, that the camels each became infected at about the same time both by the trypanosome of surra and by the hæmorrhagic septicæmia bacterium; and that the latter had no effect upon the camels until they were sufficiently debilitated from the surra. There is no reason to suspect that hæmorrhagic septicæmia can ever occur as an outbreak in a number of camels.

Pneumonia.—I have found by experience that it is best to segregate cases of pneumonia, especially those occurring in camels of 4, 5 and 6 years old, and I suspect that it is contagious to camels about that age.

Infectious Catarrh.—Usually quite benign, and veterinary surgeons require no hints as to treatment. The clear discharge which is sometimes associated with the exit of camel-bots from the naso-pharynx in spring and autumn must not be mistaken for it.

Botriomycolosis is occasionally seen in camels in the form of a complication of sore-back. I have seen it in India, and it has been reported from the Sudan. When complicating sore-backs, removal of the tumour is necessary; otherwise treatment is as for horses.

(To be continued.)

Abstract.

ANÆSTHETICS.

By H. D. BERGMAN, Iowa.

It is a satisfaction to note that the use of both local and general anæsthetics is coming into much more general practice by the veterinary profession. While it is to be admitted that inadequate facilities often seem to make the use of general anæsthetics inadvisable, yet very frequently the difficulty and danger are both overestimated by the average veterinarian, but from a humane standpoint, and that of satisfactory operating, there can be no argument against. Chloroform is, of course, the most satisfactory general anæsthetic for the larger animals, and it is surprising what results may be derived from a very small amount if properly administered. A dozen anæsthesia sheets taken at random from our College Hospital Clinic reports show that on equines the time taken to establish anæsthesia was fifteen minutes, duration of anæsthesia varied from twenty to thirty minutes, and amount of chloroform used averaged less than 4 ozs., the drop method of administration being used.

Our method with dogs is to administer from one to two grains of morphine hypodermically about twenty minutes before the operation. A few inhalations of chloroform will then put the animal into a nic state of anæsthesia. The period of recovery is usually from four to five hours.

Of late we have been making use of rectal injections of chloral

hydrate in hogs, sometimes followed by a few inhalations of chloroform, but more often not. The dosage of chloral is about $1\frac{1}{2}$ to 2 drams per 50 lb. weight. The chloral, on account of its irritant properties, should be well masked, dissolved, for instance, in 4 ozs. of some fixed oil or glycerine. While this does not give a complete anæsthesia, yet the results are very satisfactory. Twenty to thirty minutes should elapse before operating following the administration of the chloral hydrate.

As to local anæsthetics, cocaine, stovaine, and alypin seem to fulfil the majority of indications in veterinary medicine. For the past year or so alypin has been used largely as a local anæsthetic at the College Hospital Clinic. It seems to possess all the advantages of cocaine without the disadvantages. It is generally used in 5 per cent. solution in regional surgery, the action being noted in about five minutes and continuing equally as long as cocaine. It may be combined with adrenalin solution very advantageously. No symptoms of intoxication, painful after effects, or necrosis of the skin at the seat of injection have been noticed following its use.—*Journal of American Veterinary Medical Association.*

Reviews.

SHEEP DISEASES, by E. T. Baker, D.V.M., pages 228, illustrated. American Journal of Veterinary Medicine, Chicago, 1916. Price 2 dollars 50 cents.

This is the 12th volume of the Veterinary Medicine Series, edited by D. M. Campbell. It is a useful book for the veterinarian and stock-owner, well illustrated and concisely written. It is a text-book dealing more with sheep on big ranges than with ovines kept chiefly confined and folded as they are in this country. Any ailment of sheep can, however, be readily referred to, and knowledge of the condition, symptoms, and treatment can be gathered from the text. The field of disease surveyed is a very comprehensive one, but louping ill or trembling and trotting diseases are almost unknown in America. The best chapter in the book is that on poisons, and the illustration of some of the plants poisonous to sheep are beautifully done. In the chapter on parasitic diseases we notice no reference to *tricocephalus affinis*, which causes much trouble among sheep in certain districts here. The author, to our mind, is very pessimistic as to the treatment of some sheep complaints. The surgical operation for "gid" is not mentioned; treatment for fluke is said to be hopeless. Piroplasmosis is stated not to exist in America, but we are of opinion that cases occur in sheep in many countries where the disease is neither recognised nor diagnosed.

No instructions are given as to how to castrate a ram. We have done many successfully with steel clams with graduated screws, and we believe it to be the best way to avoid fatalities in this animal. All veterinary surgeons who castrate lambs may advantageously note the method given by the author in these words: "Select a clean dry

place for this work (the lambs being about two weeks old), and with disinfected hands and knife hold the lamb, and cut off the lower third of the scrotum (the italics are ours). Pull the testicle and entire cord out. In older lambs the cord may be scraped off."

A very interesting chapter in the book, which, fortunately, does not apply to us here, is that on "Predatory Animals." We learn from it that the coyote, the wild cat and lynx, the wolf and cougar, the bear and the prairie dog, all make raids on sheep. Truly the life of a shepherd in some parts of the great American continent must be full of adventure and incident, and not of such a ruminating peaceful, nature as in this country.—G. M.

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This, the first number of a new periodical, gives an account of current literature of interest to the veterinary specialist and practitioner. Its contents consist of an article on "Feeding and Economy," by Professor R. G. Linton, M.R.C.V.S.; abstracts, reports, reviews, notes on books, and bibliography. As a quarterly recording the appearance of current veterinary pabulum, and giving the pith of matter printed in America, France, and our Colonies, it will be found useful and time-saving to the practitioner who wants to refer quickly to any subject without reading deeply on it, or who desires to know where he can obtain further information on matter interesting to him.

To the author and compiler of veterinary books it will be a friend in need; and even the writer of a paper to be read before an assembly of veterinary surgeons can consult it with profit and benefit to his outlook.

We have long wanted a bibliography of current literature in the English language; and if future lists are as complete as the one given in the opening number, the new periodical will no doubt do good and valuable work. The first issue consists of 102 pages, and is well printed and attractive in appearance. G. M.

NOTICES.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone: 4646 Gerrard. Telegrams: "Baillière, Rand London."

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FLIGHT-COMMANDER SIDNEY SMITH, D.S.O.,
CROIX DE GUERRE
(Formerly of the Army Veterinary Corps (T.F.) and now in
the Royal Flying Corps).

THE
VETERINARY JOURNAL

Editor :

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MAJOR IN THE ARMY VETERINARY CORPS, AND FORMERLY PROFESSOR IN
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Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

MAY, 1917.

Biography.

FLIGHT COMMANDER SIDNEY SMITH, D.S.O.
(Croix de Guerre).

It is not given to every man to excel in three such opposite branches of the Service as the Army Veterinary Corps, the Royal Artillery, and the Royal Flying Corps, but our distinguished young colleague has done it—and done it well, too.

Born in Lowestoft, the son of a well-known and very popular veterinary surgeon there, Mr. Sidney Smith, junr., qualified from London in 1907, and joined his father in the practice of his profession. Having always a liking for a military life, he joined the Army Veterinary Corps as a Territorial, but presently transferred to the Artillery, where he rapidly rose to the rank of Major and gained the command of his battery.

Seeking fresh fields to conquer, he again transferred to the Royal Flying Corps, in which, with phenomenal rapidity, his brilliant talents have been so much appreciated that he is already a Flight Commander, has been mentioned in despatches, and has been decorated with a D.S.O. and the Croix de Guerre. The latter was pinned on by no less a person than General Joffre himself. We of the profession are proud of him, and that he may yet receive more honours is the wish of his former colleagues in that profession; but, more than that even, is the wish that he may come back safely, whole in limb and body, from the "Great Adventure," to help in which his patriotism has caused him to forego all the comforts and luxuries of a quiet country life.

Editorial.

SOME DISEASES OF WAR AND THEIR URGENT SIGNIFICANCE IN REGARD TO THE RETURN OF HORSES TO ENGLAND.

THIS war like all others is teaching us many lessons and bringing in its train many new experiences for the members of our profession, in common with those taught to other branches of the Army.

One of the most important, and one which must some day receive the most careful consideration, is that of the return of horses from the War Area to England when the "Great Game" is finished. The fate of hundreds of thousands of horses will be involved, and it not only concerns the horses at present in the fighting armies, but also the stock left at home. It is one upon which the veterinary profession will be bound to be consulted, and one, too, upon which *we* must give the deciding word.

In the present number of the JOURNAL two diseases heretofore non-existent in peace time in England have attention drawn to them, and everyone who has seen evidence of the damage done by Epizootic Lymphangitis and Stomatitis Contagiosa will agree that these two diseases must be guarded against at all costs.

Add to these Ulcerative Lymphangitis, Ulcerative Cellulitis, and Glanders, and we have a group of diseases which, if left unchecked and uncontrolled, would quickly decimate an army.

After the war the greatest care will have to be taken—and taken, too, on the advice of veterinary experts who have had experience of these diseases, and who know their job, that none of these diseases are brought back.

Glanders, thanks to the discovery of the diagnostic value of mallein, is kept well under control, and if only as much could be done by some bacteriologist for any of the others mentioned, the saving of horseflesh would be enormous. Certainly one lesson which we *must* learn is that, cost what it may, none of the above diseases must be allowed to get a footing in England, and provided due and proper care is exercised there is no reason why they should. Our insular position gives us an advantage which few countries possess.

AMERICA DECIDES.

AMERICA has now come in on the side of freedom and justice, and there is no doubt that the aid she will give will materially strengthen the armed might of the Allies. Perhaps we have not recognised some of the things she has already done for us and what a wealth of supply in the war has come from her. From the veterinary point of

view, in addition to large supplies of horses, she has supplied hundreds of thousands of mules, besides vast quantities of waggons, harness and saddles.

The American veterinarian has recently been granted his much deserved rank in the Army, but there is at present no well organised A.V.S., as we have here. No doubt, however, the occasion and the need will create this valuable unit on a firm footing, and we can trust our American colleagues to understand the necessity of first-rate organisation. As a body the American qualified veterinary surgeons were never better fitted to give a good account of themselves than they are at the present time, and in the tending of wounded and sick animals we shall derive a great accession of strength, knowing full well the great resources of that great continent. G.M.

Original Communications.

A REPORT UPON AN OUTBREAK OF STOMATITIS CONTAGIOSA.

BY MAJOR H. E. GIBBS,
Army Veterinary Corps.

This report is based on notes made by Captain G. G. Pook, A.V.C., who conducted the experiments during a recent outbreak in a Veterinary Hospital.

PERIOD OF INCUBATION.

"A," *Artificial*.—Judging from the result of the ten following experiments this would appear to be a question of hours only.

1. The fluid contained in the bleb of a recently-developed case was taken and sprinkled on a piece of absorbent cotton wool; this was then rubbed on to the tongue of a horse which had been first scarified.

In 24 hours a number of typical blebs formed at site of scarification; these coalesced to form one large lesion.

2. The fluid from an unbroken bleb was extracted by means of a mallein syringe and needle.

Some was injected beneath the mucous membrane on the dorsum of the tongue of an apparently healthy horse, and the rest into the front of the coronet, under rigid aseptic conditions.

In 24 hours a typical bleb had formed at point of inoculation on the tongue, and in less than 48 hours several others in the neighbourhood; these also coalesced and formed a very large lesion.

Nothing happened to the coronet.

"B," *Natural*.—The following experiment was carried out under various conditions which would approximate, as far as possible, to one's ideas of means of natural infection:— G.M.

Ten horses and five mules were selected and put together in one stable and kept rigidly isolated in every possible way.

They were artificially infected in the following ways :—

No. 1 horse was watered from a bucket that contained a cupful of saliva from a badly infected case.

No. 2 horse.—The hand was placed on an open tongue lesion of a bad case and immediately rubbed on the tongue of this horse.

No. 3 horse.—Absorbent cotton wool, previously rubbed on an open lesion of a bad case, was rubbed on the inner surface of the lips of this case.

No. 4 horse.—A small feed in a new nose-bag with a cupful of saliva from a badly affected case sprinkled on it was fed to this horse.

No. 5 horse.—This animal's tongue was scarified, and the hand having previously been rubbed on a lesion of a bad case was at once rubbed on the scarified area of this horse's tongue.

No. 6 horse.—Absorbent cotton wool, previously contaminated from a bad case, was rubbed on the upper and lower surfaces of the tongue of this animal.

No. 7 horse.—Hay was masticated by a badly affected animal, and then taken from its mouth and fed to this horse.

No. 8 horse.—Saliva from a badly infected horse, mixed with a bran mash, was fed to this horse.

Nos. 9 and 10 were not infected, being left to act as controls.

Mules.—Three were infected in the same way as horses Nos. 2, 3 and 7 respectively, the other two being left as controls.

RESULTS.

No. 7 developed typical lesions on the lips five days later, and on the seventh day lesions on the tongue appeared.

No. 6.—A lesion on the tip of the tongue appeared seven days after infection.

No. 10.—Lesions appeared 10 days after experiment was started ; this horse was one of the controls.

Nos. 4 and 5.—Lesions appeared 13 days after infection.

No. 9.—Lesions appeared 14 days after infection—this was the other control.

No. 2.—Lesions appeared 19 days after infection.

Nos. 1, 3 and 8 have never shown signs of the disease, in spite of the fact that all the animals of this experiment were kept together and watered from the same trough.

Mules.—These have all gone through the experiment unscathed.

The results of this experiment viewed from the standpoint for which it was conducted, namely, to get some idea of the period of incubation in naturally-affected cases, are distinctly disappointing.

On the other hand, taken in conjunction with the foregoing two experiments, they rather tend to support the opinion held here that it is the contents of the bleb which is the infective agent, and furthermore, the following experiment appears to indicate that the period of infectivity of the bleb contents is a comparatively transient one.

Five healthy horses which, as far as we know, had not been in contact with the disease, were selected, and their tongues and lips scarified. A piece of absorbent cotton wool was rubbed on a bad lesion of four days' standing, and immediately rubbed on the scarified areas of these five horses. Each horse was carefully examined on each of the 14 succeeding days, and no lesions of any description developed during this period.

TEMPERATURE.

A series of temperatures have been taken, and it has been found that it may rise to 103° F. within 24 hours of the appearance of the bleb.

We have also noticed that in those cases associated with heightened temperatures, the temperature does not persist beyond 48 hours after the appearance of the bleb.

In this connection, it would be of interest to know whether the infectivity of the bleb contents disappears synchronously with the fall of temperature. If such were the case, one could fairly definitely state that a case was non-infective two days after rupture of bleb, and such knowledge would revolutionise our methods of dealing with an outbreak.

SALIVATION.

If salivation is present at the commencement of the disease, it appears quite colourless, ropy and profuse; it frequently becomes frothy during the course of the disease.

We have also noticed animals in which the presence of profuse ropy saliva has been associated with a general congestion of the buccal mucous membrane, simulating a condition caused by a medicinal irritant; this congestion and accompanying increase of saliva have disappeared in a few days, spontaneously.

LESIONS.

(a) *Site of.*—The commonest site of lesions appears to be the dorsal surface of the tongue, but as far as we are able to judge here, one cannot state that any particular portion of this surface has a marked predilection.

The lips would appear to be next in priority of liability to infection, the most frequent spot being at the commissures; the disease, moreover, appears to develop rapidly at the line of demarcation between the skin and mucous membrane at this point.

The palate comes next, and lesions are most commonly found

immediately posterior to the upper incisors, in fact, usually impinging on them; rarely are they seen further back.

Another fairly common spot is the inside of the cheek opposite to the first molars; we have had many cases with lesions in this position, and they have usually been associated with sharp edges of upper molars.

This fact, in conjunction with the results obtained in the experiments 1 and 2 of page 1, rather convey the impression that even though it may not be absolutely necessary to have an abraded spot in the mouth to admit of entrance of the virus, the presence of such abrasions facilitates, even if it does not actually increase, the chances of infection.

(b) *Classification of.*—Size varies considerably, depending upon whether the lesion is formed by one bleb or several contiguous blebs coalescing. In the former case, they are usually about the size of a florin, with ragged, irregular edges, whilst in the latter they may extend over the whole of the dorsal surface of the tongue.

The first stage of the lesion is the formation of a bleb or blister (see Fig. 1), which contains a straw-coloured serous fluid; this bleb quickly ruptures, and the raised m.m. is shed, leaving a raw red surface, on which a few hours after shedding of m.m. a straw-coloured jelly-like substance is noticed adhering to its surface; this jelly is probably infective as well as the serous contents of the bleb, but we are at present unable to confirm this by experimental results.

(c) *Extension.*—We have observed here that when a lesion makes its first appearance at the commissures of the lips, lesions almost invariably develop on the tongue, and sometimes on the palate also.

On the other hand, in cases in which the first lesion noticed is on the tongue, the lips remain frequently unaffected, although the palate may become implicated.

There appears to be little doubt that the apparent spreading of individual lesions is really a coalescing of adjacent ones.

(d) *Course.*—From our observations the disease takes 4-6 weeks to run its course; the lip lesions heal quicker than any other.

Thirty horses were selected at random, and the number of days from start to finish averaged $36\frac{1}{2}$.

Twelve others were picked; they averaged to date $39\frac{2}{3}$ days, and it is estimated that a further period of a week must elapse before they can be considered cured.

(e) *Healing.*—As a result of further experience, we have altered our opinion as to the method of healing expressed in our previous report. We are now of opinion that healing takes place chiefly from the periphery.

It is of interest to note that in lesions affecting the lips, the healing

appears to take place chiefly from that part of the surrounding m.m. farthest away from the skin.

Fig. 2 shows a case which had a large round lesion affecting the inside of the upper lip, and it is seen that the cicatricial tissue instead of being in the centre of the original lesion closely approximates the margin of the lip.

APPEARANCE OF HEALED LESIONS.

In many cases all traces of the lesions entirely disappear, especially those that are elongated.



FIG. 1.—Showing newly formed blebs on dorsum of tongue.

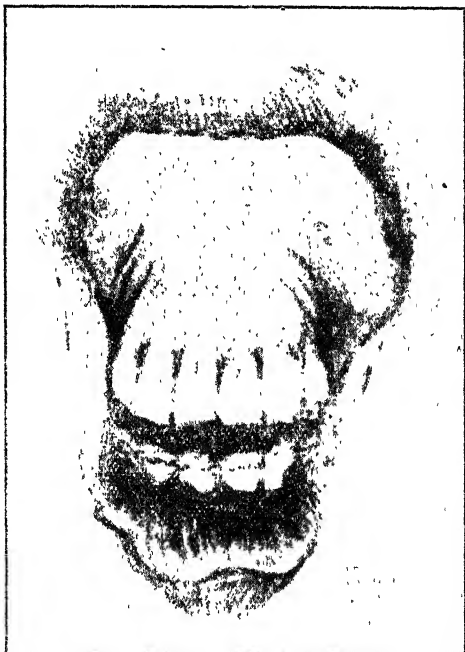


FIG. 2.—Showing band of cicatricial tissue beneath margin of upper lip.

In other cases, especially those of the tongue, the boundaries of the original lesion have a brownish outline, which is usually quite irregular (see Figs. 3 and 4), this ultimately disappears.

Large lip lesions frequently leave a scar of cicatricial tissue resembling a healed cut (see Fig. 2).

Healed lesions of the palate do not appear to leave any trace.

FEEDING.

Small lesions do not appear to affect the animal's ability to feed, whilst large lesions cause great difficulty in feeding, with a consequent

proportionate loss of condition, which in bad cases extends to emaciation

METHODS OF INFECTION.

Probably indirect infection is the usual method in operation, such as by means of water-troughs, mangers, nose-bags, bits, hay-nets, twitches, overcrowding, and consequent soiling of companion's food.

TREATMENT.

1. *Preventive*.—Isolation of affected cases followed by thorough disinfection of vacated stall fittings, stable gear, etc. The formation of

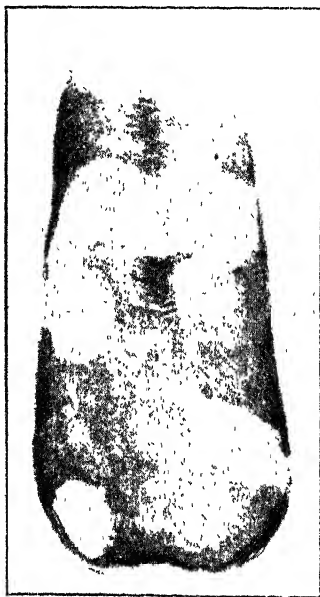


FIG. 3.—Healed lesions on dorsum of tongue, showing irregular outline.

animals into as small parties as practicable, each party to become as self-contained and separate as possible with regard to watering, feeding, and attention.

Daily—or, better still, twice daily—mouth to mouth inspection, followed by immediate removal of all suspicious cases. In cases in which unbroken blebs are found, the bleb to be removed and the exposed surface to be dressed with a mild caustic.

2. *Curative*.—(a) *General*.—Soft feed (bran and linseed mash, steamed oats, gruel in very bad cases, steamed hay, etc.).

Tonics and stimulants and attention to hygienic principles generally.

(b) *Local*.—We have tried various drugs, such as potass. permanganate, zinc. chlor., potass. chlor., alum in water, used in form of collutoria.

We have found touching lesions with zinci. chlor. most satisfactory, especially in those affecting the lips.

UNNAMED DISEASE.

This disease differs from the true Pustulosa Contagiosa, in so far as it is possibly more readily transmissible, certainly



FIG. 4.—Healed lesions on dorsum of tongue; these are older lesions than those of Fig. 3.

extremely benign, and has apparently no deleterious effects on animals suffering from it.

Since writing our previous report, we have conducted some experiments in connection with it, and from our observations thereon, have been led to modify the views previously held by us.

LESIONS.

(a) *Characteristics*.—There are usually one or more lesions which are practically always round, having the appearance of a piece of m.m. punched out. When situated on the median line of the ventral surface of the tongue, they are elongated.

(b) *Position*.—They are found on the ventral surface of the tongue (never on the dorsal surface) and on the lips.

(c) *Healing*.—Healing takes place both from the periphery and the bottom, the reparative processes being very rapid, especially those of the lip.

As far as we know at present, a depression of cicatricial tissue remains for some time to indicate the position of the lesion.

The first indication of repair is the filling of the lesion with a whitish-grey substance, which on palpation appears quite soft, and can be easily detached; this is in contradistinction to the true Stomatitis, in which the healing surface remains quite a raw red until closed over by multiplication of cells from its edges.

General.—There is no rise of temperature, undue salivation or impaired feeding.

DETAILS OF EXPERIMENTS.

All animals selected for this experiment were free from any lesions in the mouth.

Horse No. 1.—Absorbent cotton-wool was rubbed on a lesion and then placed on the inferior surface of tongue of this horse.

Horse No. 2.—The hand was placed on a lesion and then rubbed on the tongue of this horse.

Horse No. 3.—This horse was given water that had been infected by means of saliva from a bad case.

Horse No. 4.—Hay was masticated by an infected horse and then given to this one.

Horse No. 5.—The hand was placed on a lesion and then rubbed on the lips of this horse.

Horse No. 6.—Absorbent cotton-wool was rubbed on a lesion and then on to the lips of this horse.

Horse No. 7.—Same as No. 5.

Horse No. 8.—Not infected.

Horse No. 9.—This horse was given feed that had been masticated by an infected horse.

Horse No. 10.—Same as No. 5.

Two mules were infected in the same manner as horse No. 5, the other three were kept as control animals.

Horses Nos. 1 to 8 developed lesions the day after the experiment was started, No. 9 two days after experiment.

No. 10 developed no lesions during the course of the experiment.

Mules Nos. 1, 3 and 5 developed lesions the day after the experiment was started, mule No. 4 the second day after the experiment was started, mule No. 2 the fifth day after experiment.

I am indebted to Pte. Noble, of this Hospital, for the plates illustrating various stages of lesions.

REMARKS ON THE SURGICAL TREATMENT OF QUITTOR.

By LIEUT. J. A. MATHESON.

Army Veterinary Corps.

Herewith is a brief resumé upon a modified method of operating for quittor, which has proved very successful.

The animal is cast and chloroformed in the usual way and a tourniquet applied.

A certain amount of swelling will be found in the region of the coronet. The wall of the hoof is then rasped as thin as possible, for fully half way down to the ground surface, till it yields readily to pressure of the fingers.

All horn is then cut away from under the coronary band, and an incision is made underneath it and carried upwards, between the skin and the outer surface of the lateral cartilage, to its upper border and carried over its whole extent as far as the swelling extends.

The coronary band is then raised and held by a retractor, and another incision is made through the lateral cartilage along its lower border, where it joins the os pedis, and carried upwards underneath its inner surface, parallel to the first incision.

With the aid of the French quittor knives, right and left, the cartilage can then be easily removed. If not involved, it has been found best to leave the anterior portion overlying the pedal bursa, as it is only in exceptional cases that it ever becomes necrosed as a sequel, and there is less danger of an open pedal joint ensuing if that piece of cartilage is left.

All necrosed and discoloured tissue is then removed, the sinuses pared round their edges till healthy tissue is reached, and all loose pieces of tissue removed from the interior of the wound.

The wound and surrounding tissues are now painted with iodine and packed with boric acid powder, to which has been added hydrarg. biniodide, grs. xx to the ounce. Compresses of cotton wool, which have been sterilised by boiling, are applied over the wound and coronet, and bandaged with a calico bandage, 2 or 3 ins. wide, as tightly as possible.

The temperature is taken daily, and, if no rise occurs or other signs

seen that the wound is not healing normally, the dressing is left on for fourteen to sixteen days.

If the operation has been carried out under strict aseptic precautions, the surface of the wound will be found level with the hoof, dry and firm, with a bright rose pink colour, and in another week a thin layer of horn will have formed.

Frequently when the lesion is complicated by necrotic dermatitis, sinuses will be found to penetrate into the deeper tissues of the hoof,

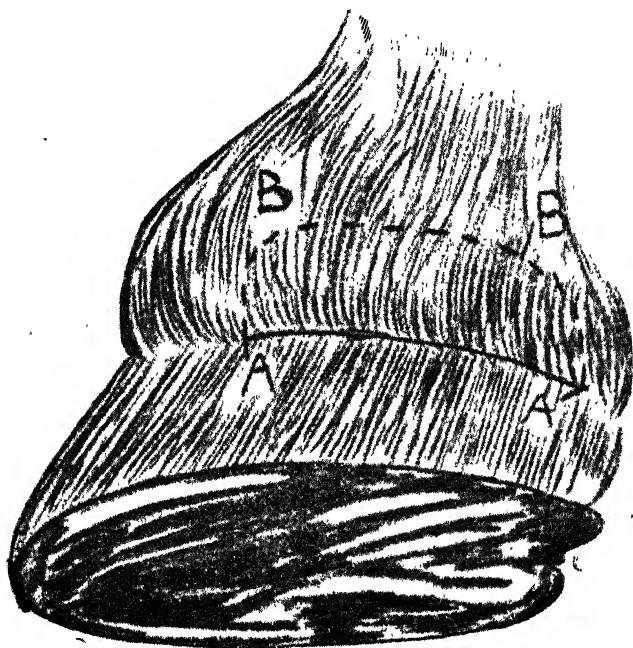


FIG. I.

A, Primary incision below coronary band.

B, 2nd incision, through A and under surface of skin over the whole extent of the lateral cartilage and the apparently diseased tissues.

as far as the perforans tendons and lateral ligaments, but if the necrotic tissue is all removed, recovery takes place readily.

This operation has been discredited as being a failure, both from a surgical and commercial point of view, but the actual cases detailed below go to prove that if proper care is given to the details of the operation it is very successful.

Emphasis might be laid on the following points :—

1. That the wound must be thoroughly aseptic before being tied up.
2. The inside of the wound must be perfectly smooth and all loose pieces of tissue removed, also all discoloured tissue.

3. That the compresses are applied sufficiently tight to keep the two surfaces in apposition and retained so until union has taken place. False quarters or deformity of the hoof seldom or never occurs, and the only permanent lameness resulting has been in cases where sidebone was found at the time of operation.

The following cases, 123 in all, have been operated on in this hospital between October 20th, 1916, and January 20th, 1917; and as this hospital adjoins a receiving hospital, the majority were extreme cases, too lame to be travelled further.

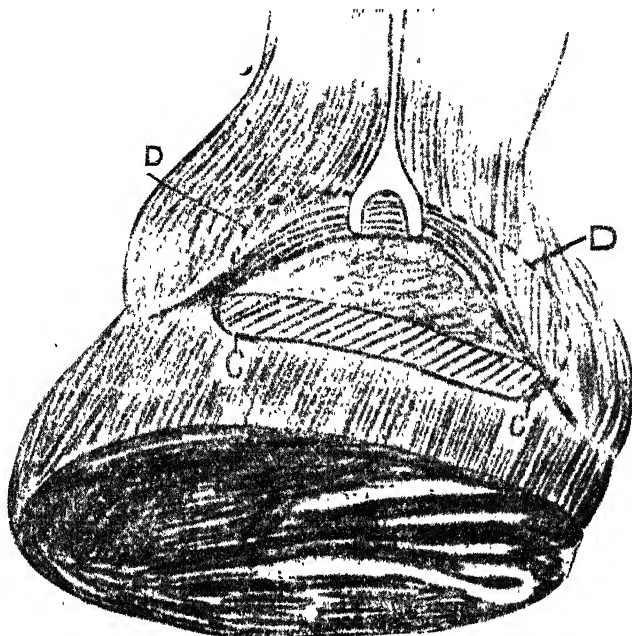


FIG. II.

C, 3rd incision, below A and through the lateral cartilage, direction towards centre of the foot.

D, 4th incision, carried from below upwards, and parallel to B. The skin over the whole area—i.e. that shown by dotted lines—is left intact.

Twenty-four have been destroyed. Of that number six were due to diseases and injuries other than the original quittor. Three were destroyed at the time of operation, the pedal joint being found purulent, while two died a few days after operation.

Those in the table not yet discharged only require time. In some cases, so much of the tissues of the foot were removed that time is required for the foot to stand work; others are kept back for their condition, etc. In a few cases, a sinus again appeared in the course in a few weeks, but was usually easily dealt with, being quite superficial and requiring only to be opened up freely so as to allow drainage.

LIST OF QUITTOR CASES.

Hospital Number.	Colour.	Sex.	Disease.	Date of Operation.	Date of Issue.	REMARKS.
B181	Bay	Mule	Quititor	20-10-16	9-1-17	Anterior border of cartilage affected, perforans tendon necrosed.
B170	"	M	"	21-10-16	1-1-17	Necrosed part overlying pedal joint.
A835	"	M	"	21-10-16	6-2-17	Extensive necrosis of coronet and coronary band. Developed open joint and destroyed.
B360	Roan	M	"	26-10-16	11-11-16	Coronary band necrosed.
B334	Ches.	G	"	26-10-16	—	Necrotic part of cartilage overlying pedal joint.
B355	Bay	M	"	26-10-16	28-12-16	—
B283	"	M	"	27-10-16	15-1-17	—
421	"	M	"	28-10-16	1-1-17	—
B227	"	M	"	28-10-16	8-11-16	—
B333	"	M	"	30-10-16	7-1-17	Necrotic tissue involving tissues as far as flexor tendons.
B476	"	M	"	30-10-16	24-12-16	—
B435	"	G	"	30-10-16	26-12-16	Destroyed for canker in opposite foot.
B524	Ches.	G	"	31-10-16	7-1-17	Necrotic dermatitis involving coronary band.
B346	Bay	M	"	3-11-16	28-12-16	Necrotic dermatitis involving coronary band
B242	"	M	"	4-11-16	27-11-16	—
B678	"	G	"	6-11-16	18-12-16	—
B626	"	G	"	10-11-16	15-1-17	—
1194	Roan	G	"	10-11-16	—	Quititor healed, but destroyed for injury to forearm.
B944	Brn.	G	"	25-11-16	6-2-17	—
C207	Blk.	G	"	25-11-16	25-1-17	Flexor tendons necrosed. Destroyed same time.
B532	Blk.	C	"	29-11-16	—	Flexor tendons necrosed, wall and base of os pedis exposed and all tissue removed. Bone curetted.
C17	Bay	M	"	29-11-16	—	Flexor tendons necrosed. Destroyed for open joint opposite foot, picked up nail.
B459	"	M	"	1-12-16	20-1-17	Os pedis exposed. Fatty frog removed, due to necrotic dermatitis.
B902	"	G	"	1-12-16	—	Lateral cartilage partially ossified.
C537	Brn.	G	"	2-12-16	7-1-17	Necrosis tissue removed exposing os pedis.
C246	Bay	G	"	4-12-16	6-2-17	Necrosis tissue extending to capsule of pedal joint.
C247	"	M	"	4-12-16	10-2-17	Flexor tendons involved by necrosis.
C290	"	M	"	4-12-16	—	

C20	"	M	O.H.	4-12-16	—	Coronary band necrosed.
C226	"	G	O.H.	5-12-16	8-2-17	Destroyed for open joint.
C240	Brn.	G	O.H.	6-12-16	6-12-16	Wing of os pedis exposed.
C649	Bay	M	N.F.	7-12-16	—	Developed open joint, destroyed.
C242	"	M	O.F.	6-12-16	20-12-16	
C263	Brn.	G	O.H.	7-12-16	—	
C542	Grey	G	N.F.	11-12-16	14-12-16	Joint found open. Destroyed same time
C690	Bay	G	O.F.	9-12-16	—	
B476	"	M	N.H.	11-12-16	24-12-16	Destroyed 24-12-16. Open pedal joint.
C449	"	M	O.F.	12-12-16	23-12-16	Destroyed for open joint.
A867	"	M	O.F.	12-12-16	20-1-17	Destroyed for open joint 20-1-17.
C796	"	M	N.H.	13-12-16	—	Fractured piece of os pedis removed.
B420	Brn.	M	O.H.	14-12-16	29-1-17	Flexor tendons and lateral ligament necrosed.
557	Bay	M	N.H.	14-12-16	22-1-17	
C798	Ches.	G	N.H.	15-12-16	—	Flexor tendons necrosed. Piece of os pedis removed.
B143	Brn.	M	N.H.	15-12-16	—	Os pedis exposed, necrosis extending to capsule of joint.
C793	Bay	G	N.F.	15-12-16	—	Piece of detached os pedis removed. Sole underrun.
C901	"	Mule	O.H.	16-12-16	5-1-17	Developed open joint and destroyed.
C795	"	M	O.H.	16-12-16	—	Necrosis extending to capsule of joint.
C850	Brn.	G	N.H.	16-12-16	—	Extensive necrosis of tissue of coronet.
C498	Bay	M	N.H.	18-12-16	10-1-17	Necrosis extending to flexor tendons and lateral ligament of pedal joint; also to os coronæ.
C900	"	M	O.H.	19-12-16	—	Piece of detached os pedis removed.
C902	"	Mule	O.F.	19-12-16	—	Cartilage partly ossified.
C800	Grey	G	O.F.	19-12-16	—	Extensive necrosis of coronet.
C916	Bay	M	O.H.	19-12-16	—	
C893	Ches.	Mule	N.H.	20-12-16	—	
C264	Bay	G	N.H.	20-12-16	—	Extensive necrosis of coronet.
A950	Roan	M	N.H.	20-12-16	15-1-17	
C899	Ches.	M	O.H.	20-12-16	—	Extensive necrosis of coronet.
C955	Blk.	G	N.F.	20-12-16	—	Been operated on previous to admission. Necrosis extending to capsule of pedal joint.
C952	"	M	O.H.	21-12-16	7-1-17	
C982	Grey	M	N.H.	—	—	
C990	Blk.	M	O.H.	22-12-16	12-2-17	Part of os pedis detached. Necrosis extending to capsule of pedal joint.
C448	Bay	G	N.F.	23-12-16	—	Extensive necrosis of tissue in heel. Flexor tendons involved. Destroyed for open pedal joint.

LIST OF QUITTOR CASES—continued

Hospital Number.	Colour.	Sex.	Disease.	Date of Operation.	Date of Issue.	REMARKS.
C951	Bay	G	Quittor N.H.	23-12-16	—	Necrosis of coronary band, slough extending to capsule of pedal joint.
B202	Blk.	G	O.H.	24-12-16	—	Necrosis of flexor tendons, os pedis exposed.
C457	Ches.	M	N.H.	26-12-16	9-2-17	Ossification of lateral cartilage (partial). Destroyed for open joint.
D116	Brn.	M	N.F.	28-12-16	2-1-17	Destroyed for open joint.
D165	Bay	M	N.H.	28-12-16	—	Necrosis of flexor tendons.
D145	Ches.	M	N.H.	28-12-16	29-1-17	Detached piece of pedal bone removed.
D132	Bay	G	O.F.	29-12-16	—	—
D147	"	M	N.H.	29-12-16	—	—
D152	"	G	N.H.	29-12-16	—	—
D141	"	G	N.H.	29-12-16	—	—
D168	"	Mule	O.H.	30-12-16	10-2-17	Destroyed for open joint.
D126	"	G	O.H.	30-12-16	8-1-17	Detached piece of os pedis removed.
D158	"	M	N.F.	30-12-16	—	Wall and sole underrun. Bone curetted. Destroyed for open joint.
B660	"	M	O.H.	2-1-17	20-1-17	Destroyed for open coronet joint.
B590	Blk.	M	O.F.	2-1-17	—	Cartilage partly ossified.
I210	Bay	M	N.H.	2-1-17	—	Extensive necrosis of tissues.
B458	"	Mule	O.F.	4-1-17	10-2-17	Extensive necrosis of tissues.
C385	Brn.	M	O.H.	4-1-17	—	—
B140	"	M	N.H.	4-1-17	—	—
D299	Bay	G	O.H.	5-1-17	—	Portion of coronary band sloughed.
D297	"	G	O.H.	5-1-17	—	Partial ossification of cartilage.
D303	"	G	O.F.	6-1-17	—	Necrosis of coronary band and surrounding tissues.
C799	"	M	N.F.	6-1-17	—	Side bone present and removed with bone forceps.
D304	Ches.	G	O.H.	6-1-17	31-1-17	Destroyed for chronic debility
D364	Bay	M	O.H.	6-1-17	—	Extensive necrosis of tissues.
D363	Roan	M	O.H.	8-1-17	—	Flexor tendons and surrounding tissues necrosed.
D357	Bay	M	N.H.	8-1-17	10-2-17	Necrosis of coronary tissues.
D361	Blk.	M	O.H.	8-1-17	—	Necrosis of coronary band and flexor tendons.
D362	Bay	M	O.H.	8-1-17	—	—
D399	"	M	N.H.	9-1-17	14-2-17	Capsule of pedal joint discoloured. Destroyed for open joint.

D131	Grey	G	"	N.H.	9-1-17	---	Necrosis of skin and underlying tissue present.
D157	Blk.	M	"	O.H.	10-1-17	---	Necrosis of skin.
D358	Bay	M	"	N.H.	10-1-17	---	Necrosis of skin and flexor tendons present.
D359	"	G	"	O.H.	10-1-17	18-2-17	
D380	Blk.	M	"	N.H.	11-1-17	---	Necrosis of coronary band and tendons. Destroyed for open joint.
D472	"	G	"	N.H.	11-1-17	18-1-17	
D12	Bay	M	"	O.F.	11-1-17	---	Necrosis of skin and underlying tissues.
D476	"	M	"	O.F.	12-1-17	2-2-17	Necrosis extending to pedal joint. Destroyed for open pedal joint.
D470	"	G	"	N.H.	12-1-17	---	Extensive necrosis of skin and coronary band
D499	"	G	"	O.H.	12-1-17	---	Necrosis extending to capsule of joint.
D471	Ches.	G	"	N.H.	12-1-17	---	Extensive necrosis present.
D469	Bay	M	"	O.H.	14-1-17	---	Extensive necrosis present.
D473	Blk.	M	"	N.H.	14-1-17	24-1-17	Destroyed through fractured spine, caused by slipping up in stable.
D474	"	G	"	N.H.	14-1-17	---	Destroyed for open pedal joint.
D612	"	G	"	O.H.	14-1-17	16-1-17	Extensive necrosis of skin present.
D300	Ches.	M	"	N.F.	15-1-17	---	Extensive necrosis of skin present. Died pneumonia.
D477	Blk.	G	"	N.H.	15-1-17	18-1-17	
D287	"	G	"	N.F.	15-1-17	---	Deep necrosis of coronary tissues present. Died debility
D664	Bay	G	"	N.H.	15-1-17	9-2-17	Detached piece of os pedis removed. Extensive necrosis also present.
D000	"	M	"	N.H.	16-1-17	---	Sinus extending to capsule of joint.
D212	"	M	"	O.F.	16-1-17	---	Slight necrosis of skin.
D297	"	M	"	O.H.	17-1-17	---	Extensive necrosis present. Wall and sole underrun.
D739	"	G	"	O.H.	17-1-17	---	
D332	"	M	"	O.H.	18-1-17	---	
D302	"	M	"	O.H.	18-1-17	---	Extensive necrosis present, flexor tendons involved.
D749	"	G	"	O.H.	18-1-17	---	Extensive necrosis of flexor tendons. Destroyed for open pedal joint.
D837	"	M	"	O.F.	19-1-17	2-2-17	Very lame. Flexor tendons involved.
D831	"	G	"	O.H.	19-1-17	---	Piece of os pedis detached. Flexor tendons involved
D942	Grey	G	"	O.H.	20-1-17	---	
D827	Bay	G	"	N.F.	20-1-17	---	
D154	"	Male	"	N.F.	20 1-17	---	

A GRAPHIC METHOD OF RECORDING LAMENESS.

BY R. C. G. HANCOCK, CAPT., A.V.C.

This method depends on the observable fact that the degree of lameness evinced by a horse is reflected in the pattern made by his hoofs in trotting over soft ground. Moreover, the degree of lameness can be determined from these footprints with a fair degree of mathematical accuracy, with no more complicated instrument than a tape measure. A series of such observations made from day to day in any given lameness can be translated into a graphic curve that is often of very material assistance to the surgeon in diagnosis and prognosis; in recognition of progress or retrogression with a greater delicacy than the eye; in the discovery of imminent complications. A number of lamenesses appear to possess each some peculiarity when their course is plotted, such as a typical curve, easily recognised. This may prove of great diagnostic value in some of the more obscure and rare forms of lameness.

It has long been recognised that in the making of a step the limb performs two distinct actions of equal duration in a sound horse. One is the swing of the limb from the ground forward until it again comes to rest. The other is the period when the foot remains in contact with the ground. The former one terms the swing, the latter the support phase. A horse showing lameness in one or the other will be said to suffer from swinging lameness, or supporting lameness.

Fig. 1 represents the footprints of a sound horse at the trot, the fore feet only being shown for greater clearness. The off fore B comes to the ground, and whilst there in support, the near fore goes through its swing phase from A to C. So also the off fore swings B to D in its turn. In regard to this swing, say of the near fore, it will at once be seen from the diagram that it may be divided into two parts, A B and B C, of equal length, the position of the opposite foot at B being the point of measurement.

Let us call the portion of the swing A to B the "approach" swing, and from B to C the "departure" swing.

Now, turning to consider the footprints in lameness, first take a case of supporting lameness, where the pain is evinced whilst the lame leg is on the ground. The animal endeavours to shorten this painful period, and so accelerates the swing of the sound foot. If the lameness be on the near fore, then, as shown in Fig. 2, the sound off fore comes sooner than usual to B, and the distance A B will be found shortened considerably in consequence, so freeing the lame leg of its supporting function, and allowing it to commence its swing. Now, the swing being without impediment and pain, is of normal length. But the portion A B is already shortened, so that B C will appear proportionately increased.

we are dealing with a 2.45 per cent. lameness, roughly $2\frac{1}{2}$ per cent. A daily record from now will readily shew whether resolution, or some complication as suppuration is likely. For purposes of description when recording cases in periodicals such a method is invaluable. One soon begins to get a pretty shrewd idea, when a lame horse is trotted, what his "lame percentage" is.

It is hoped later to publish a series of cases recorded graphically by this method; meanwhile, the publication of this method may induce others to commence the recording and plotting of both common and uncommon lamenesses, so adding to our knowledge of one of the most difficult branches of the veterinary art.

INTERESTING CASE IN A FOAL.

By LIEUT. H. FRASER, A.V.C., Bideford.

ON July 26th I was called upon to attend a Shire colt foal about three months old, which was being got up for show. The foal on being haltered fought a good deal, and was rather troublesome. Time was short, foal backward in condition, and a liberal diet of a ready-made mixture of oats, beans, maize, etc., was being fed.

On examination, foal was extremely tender and painful over abdomen, and remained so all through the case. No flatulence, and no motion from bowels. Almost continually grunted, and gave an occasional cough, but still sucked his mother and willing to feed. Pulse 84; temperature $103\frac{3}{4}$; and respiration hurried. Near hind limb swollen up to the hock.

Diagnosis.—Congestion of bowels, due to overfeeding. I have several times seen cases in foals of what I considered to be a general congestion, and thought this one of such. The cough caused some thought, but I could find no evidence of lung trouble, and put it down to stomach.

Treatment.—Colt was in a very clean, well-ventilated box. Mare brought in every two hours for him to suck, which he did greedily, and was allowed no other feeding. Gave a light dose of linseed oil and stimulant. Left two doses of æth. nit. and spirits ammon. aromat.—one for that evening and one next morning.

July 27th.—Foal much the same. Occasionally showed slight colicky pains. Still sucking. Gave enema, but no result. Left some powders containing each Sod. Bicarb., Pulv. Gent. *a.a.* 31½ P. Nux. Vom. 15 grs.—one every four hours in linseed gruel. Called back early afternoon, as owner considered foal worse. Did not think so, and found foal had passed on two occasions about a pint of liquid fæces, very foul, and contained practically no solids.

28th.—Foal seemed a little better. Pulse 72; temp., $101\frac{1}{2}$ ° F.,

but no bowel motion ; repeated enemas, no avail. Urinated naturally, still giving occasional cough, especially when drenched. Advised attendants to drench most carefully, but still could detect no lung trouble.

29th.—Foal much worse, and distinct evidence of lung trouble. Still sucking mare. Pulse 84 ; temp. $104\frac{1}{2}^{\circ}$ F. No bowel motion. Applied hot fomentations over chest and abdomen to satisfy owner, but was very reluctant to do so, as weather so hot. Gave 5i doses of Aeth. Sulph. every two hours. Drenching in pneumonia I know is bad treatment, but by now I considered case fatal, and owner one who could not be satisfied unless he saw a lot being done.

30th.—Foal worse. Pulse 120 ; temp. $104\frac{1}{2}^{\circ}$ F. No bowel motion. Still sucking mare. Fomentations stopped.

31st.—Dead on arrival.

P.M.—Intussusception of small bowel in two places. In anterior portion about 16–18 ins. of bowel displaced and posteriorly about 3 ins. lungs showed severe symptoms of broncho-pneumonia.

This to me was a most interesting case, as I had never seen one of intussusception before. I am also a little puzzled as to inception of pneumonia. Was it traumatic from drenching, or did it supervene during course of condition ? I am inclined to think it was the latter, as attendants were most capable and warned to be careful. Had the pneumonia not set in I believe foal would have lived some days longer before death resulted from intussusception.

CANINE, FELINE, AND PORCINE CASES.

By G. MAYALL, M.R.C.V.S.

(1) AN Aberdeen terrier, brought to me by a man who had been medically attended for some time for lung trouble. The dog had a husky cough, noticeable most when running about or excited ; temperature $102\frac{1}{2}$; pulse 90 ; respirations 30 per minute. He had been gradually losing flesh for about six weeks. On opening his mouth, a nodule, which I assumed to be tuberculosis, was visible about two-thirds of the way down the palate ; digital exploration of the pharynx and larynx revealed another nodule on the back of the larynx. The dog was destroyed, and there were pleuritic effusion in chest, nodules on the pleuræ and in the liver.

(2) A black Pom, with a persistent cough, belonging to an old lady, who had resided in Russia for some years, was brought to me for examination. For a little dog the cough was about the loudest I have ever heard. Nothing visible in the mouth, but at the back of the throat white tenacious mucus could be seen. Digital examination of the pharynx and larynx revealed three nodules on the

base of the cavity. The Pom was destroyed, as he was evidently tuberculous.

(4) A Welsh terrier, running at the nose and eyes (probably distemper). I called it bronchial catarrh and conjunctivitis. Temperature 102; pulse 90; respirations 20; no cough. Treated by cleansing the nose and eyes with cotton-wool and smearing eucalyptised vaseline on them twice daily. Internally, $\frac{1}{2}$ drachm doses of elixir terpin. co. (terpin. hydrate $\frac{1}{2}$ grain, aceto morph. hydrochlor. 1·96th grain). Recovery in three weeks.

(5) A black mongrel dog (about double the size of a Schipperke), discharging at eyes and nose. Temperature 104; pulse 100; respirations 40. Diagnosis as in case 4. Gums bleeding. Dressed the mouth daily with a solution of adrenalin and witch hazel. Cleansed the eyes and nose with wool and applied eucalyptised vaseline twice daily. Internally, elixir terpin. co. $\frac{1}{2}$ drachm, liquor am. acet. $\frac{1}{2}$ drachm, twice daily. Recovery in three weeks.

(6) Barred cat, nearly at full term of pregnancy. Had the hook of a watch-chain inserted through the tendon just above the hock, Pushed the movable piece of the hook down, and turned the hook out, cat being hooded with a leather hood, and paws firmly held.

(7) A barred tomcat, the property of an M.P., suffering from two punctured wounds, one between the ears and the other penetrating through the lower eyelid into the conjunctival sac. Copious purulent discharge from the corner of the eye which persisted for six weeks. This cat was under treatment from December 16th, 1916, to February 5th, 1917, and the wounds caused much trouble in healing. They were both badly infected, and the cat was chloroformed three times to dress them and curette the bone. The dressings used were iodoform and boric acid, hydrogen peroxide and protargol for the conjunctivitis, zinc sulphate and (finally) pure iodoform to heal the wound in the eyelid. A complication that arose was what appeared to be a tumefied orbital gland at the inner canthus of the eye. This was treated with a solution of boric acid, zinc sulphate and adrenalin, and causticed twice with pure nitrate of silver, and finally the cat recovered.

(8) A large white sow, pigged seven weeks, with a tumefied and inflamed vagina (which I had attended at a previous pigging for the same complaint). Inserted one of Burroughs, Wellcome & Co.'s Enule corrosive sub. bougies (gr. 1·25th), and next day and subsequent day owner syringed the sow out twice daily with mercuric iodide solution, 1 in 2,000. She made a nice recovery. Here the little pigs had been weaned, otherwise, perhaps, the medicaments used might have been dangerous to them.

(9) A beautiful, large white sow, first time of pigging. Sow ill, lying on side, temperature 103, a nasty, bad-smelling muco purulent discharge from the vagina; difficulty in urinating; some blood at times mixed with the discharge. I inserted a corros. sub. bougie, and at night washed passage out with a solution of hydrogen peroxide and hazeline. Three days after sow better; inserted another bougie, and washed out as before. Ordered linseed tea in the diet and, later on, buttermilk. She made a good recovery. The B., W. & Co. bougies are very handy, and can be used on all our patients; they are also very effective. Internally the sow had 2 drachms of an electuary three times daily, composed of sodium hyposulph. am. chor., and glycerrhiza.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.*

By A. S. LEESE, M.R.C.V.S.

GROSS PARASITES OF THE CAMEL.

I regret that, as all my notes are in England, I cannot give in full the modern names of all the camels' parasites; helminthologists, please excuse. The object of these notes being to assist clinicians, the subject can be briefly dealt with in the form of a list:—

INTERNAL PARASITES.

Œstrus cameli, the camel-bot, lives in the naso-pharynx, and is sneezed out in spring and autumn. Quite harmless in themselves, but I suspect them of admitting anthrax occasionally by the punctures they make.

Hæmonchus longistipes, found in abomasum and closely resembling the well-known *H. contortus* of sheep. Very common in India, and seems harmless.

Nematodirus spathiger, round worm of duodenum.

Ostertagia mentulata, small worm, gastro-intestinal.

Other round worms, also without clinical significance as far as one can judge.

Trichocephalus echinophyllus, of large intestine. Have been unable to find appreciable clinical damage.

Distoma hepaticum and *Distoma lanceolatum*.—Never seen in quantities able to cause "rot."

Tænia expansa, *Tænia centripunctata*, and *Tænia globipunctata*.—These tapeworms are met with in camels.

Echinococcus cysts are extremely common, and generally do no damage to health. I have, however, noted one case of death from suffocation due to the whole lungs (liver also) being crammed with

* For previous instalments, see page 79 (March) and page 136 (April).

cysts. The symptoms were :—Dyspnoea and emaciation, there was no cough; appetite and temperature normal.

Cœnurus cyst.—I believe a case is on record.

Linguatula larvæ (and cystic forms) are found frequently in the mesenteric glands of camels in India. The dog (and probably, also, the jackal) is, of course, the host of the adult, which lives in his nostrils. In camels, the larvæ make galleries between the medulla of the gland and the peritoneal cavity, and I have evidence which indicates that it is by this channel that the occasional passage of bacteria from the intestine to the peritoneal cavity is made possible, and I regard *Linguatula larvæ* as the indirect cause of the frightful disease of the camel which I described under the name of "Specific Peritonitis" some years ago.

Strongylus filaria is sometimes found in the bronchi. In the Nile delta the disease "husk" is a recognised camel-ailment, and was described by Piot many years ago. He stated that intratracheal injection of the usual character proved a good treatment. The symptoms were very much as with sheep; some camels get pure bronchitis, others broncho-pneumonia. Elsewhere than in Egypt, "husk" is rare as a camel-disease. I have met with one camel in India which had a mild cough, which got better without treatment; he was, subsequently (on being killed because of surra), found to harbour a few of these worms. I have had a description given to me by an old camel-breeder in the Indus delta region of a disease suggestive of "husk."

A. bilharzia was found in the mesenteric veins of the camel by me in India, but was unassociated with disease as a rule, and only with "debility" when in enormous numbers. I cannot recall its scientific name, having no notes here. It has not yet been found affecting the urinary tract.

Filaria coansii lives in the arteries of the body, more particularly in the spermatic artery. The adult female pours its embryos into the circulating blood, where they are easily seen in a fresh preparation taken from the tip of the ear. In searching for them, a two-thirds or "A" objective is a convenient magnification, and they are most numerous, generally, along the edge of the preparation. There is a great discrepancy in the accounts of camel filariasis in different countries. I have studied the condition in India, and have also made observations on the Arabian parasite, and the affected camels, as a rule, are not the worse for the fact that they carry the parasite; the only damage I have ever been able to note is a debility when enormous numbers of embryos are present in the blood; and it is only in a very small percentage of hosts that such large numbers of embryos are found. I have no hesitation in asserting that the Indian camel-filaria is not a

parasite of economic importance. In Egypt, however, Mason has come to the conclusion that the disease causes a recurring fever, especially in camels at work, and seriously affects the efficiency of camels. A possible explanation of the discrepancy may be that the two filariæ are perhaps not identical; if so, it is curious how alike they are anatomically and in habitat. Many drugs have been tried against filariasis in camels, but without any effect on the parasites.

Thelazia Leesei is found in the conjunctival secretion, and is very common. I consider that it is only very exceptionally capable of causing eye-trouble.

Onchocerca fasciata is the worm found coiled up in the subcutaneous "worm-nodules" of camels. The nodules are very conspicuous in Sudanese camels. They are harmless.

EXTERNAL PARASITES.

Lice.—A hæmatopinus of large size is found on camels. It is sometimes the cause of irritation in long coats in cold weather, and may be treated as for lice in other animals, or left alone until warmer weather Kerosene emulsion is a very efficacious remedy.

Ticks sometimes cause thickening of the skin in groin and axilla; in the latter case they may cause a fold of skin to form, which gets sore when squeezed between foreleg and body during locomotion, and so sets up a form of "blushing." In either situation the skin-thickening may be mistaken for mange. In rainy seasons, African camels infested with ticks and neglected may get a "fly-blown" ulceration below the anus which is intensely disagreeable to deal with, and dangerous to life if not vigorously treated. Ticks on the eyelids of camels may irritate the animal until by rubbing against trees, etc., he sets up conjunctivitis. There is no true "tick-borne" disease suspected in camels. Riding-camels should be de-ticked as a routine of stable management.

Sarcoptis cameli is the cause of mange, of which camels have only one form. I do not propose to describe camel-mange in this article, for various reasons. I shall only say that it is the second camel-disease in importance, and that the secret of dealing with it is in early diagnosis. The Army has had much experience of it.

Hippobosca cameli is the "forest-fly" of camels. It is met with in Africa, Australia, Baluchistan, Sind, and Dera Ghazi Khan, but I have never seen it east of the Indus in the Punjab. The flies live chiefly about the groin. Experience shows that, although they are blood-sucking flies, they stick to their host too closely to be of any practical importance in spreading trypanosomiasis. They are common in certain countries free from trypanosomiasis, and absent from huge tracts full of the disease.

NURSING SICK CAMELS.

Generally one's first care is to get the camel into the shade if possible. If not very ill, he may be allowed to potter about grazing a little close at hand in the cool hours of the day. If green meat is obtainable, well and good. If branches of trees are brought in to give to a sick camel, it must be remembered that he can get no purchase on them lying loose on the ground, and so cannot strip the leaves off; either a man should hold them for him, or the branches should be roped down at their thick ends. Such branches should be of trees without thorns, if obtainable. A camel has to be pretty bad not to eat a grain ration offered to him (if he is used to grain). Feverish or thin camels require jhools, or protection by sacks sewn together, on cold nights. In pneumonia and other fevers, in lameness of shoulder, hip, or hock, and in injuries to pads, it is very detrimental to tie the camel down in the sitting position at night, as the poor beast will get no rest. The best way of tying camels in sick lines is by a loop around the neck to a picketing rope along the ground, with sufficient length for the camel to stand if he likes; this enables him to turn round with the sun during the day. Draughts are given by pouring into the side of the mouth whilst a man grasps the lips of the camel and opens the mouth skywards. Time should be given to swallow. When a long case is frequently being dosed, a tap on the head immediately before pouring in the draught is quickly recognised as a signal that it is coming, and the end of an expiration is the time to pour. The vessel should have an open mouth, and be narrow enough at the top to get easily into the commissure of the lips; a cylindrical tin with its opening squashed in a little from side to side is as good as anything. Camels are frequently choked by camelmen who grasp the upper lip so high up as effectually to close the nostrils; all camelmen about a sick line should be taught to catch the lip nearer the end, so as to leave the nostrils free. In India, in several *post-mortems* done for camelmen, I found death due to taramira oil having "gone the wrong way."

A bolus for a camel is made the size and shape of a cricket-ball, and thrown down into the pharynx at the end of an expiration. All the gruels used for sick horses are useful for sick camels (linseed, oatmeal, wheaten flour, rice, etc.). A good nutritive is 1 lb. flour, $\frac{1}{2}$ lb. ghee, and $\frac{1}{2}$ lb. gur, made into boluses. Soup of a fat sheep's leg is a favourite Somali remedy, and there are many worse ones. Bran mash is liked by some camels, not by others; plenty of salt makes it more palatable.

There is no large animal so easily tempted to eat, when inclined to be "off his feed," than a camel. One man's duty in sick lines would be simply to go along offering food, and even placing it into the mouth of camels refusing to eat of their own accord. Camels are often started

back on to their feed in this way. When holding branches for a sick camel to strip leaves from, it should be turned after every mouthful, so as to present the best bunch of leaves towards the animal.

Water should be offered twice daily to sick camels, although they will generally refuse it.

Drugs used in camel-practice and their doses.—I exclude the treatment of trypanosomiasis, as it is outside ordinary practice. It is not necessary to have a lot of drugs for use on camels. *Internally*, I find the following drugs of great use for general work, and most of them are cheap:—

Mag. Sulph.—Dose, 1 lb. as laxative; $1\frac{1}{2}$ to 2 lb. as saline purgative, for ordinary purposes; 3 lb. as a purgative, for suddenly-occurring brain and spinal troubles. I prefer not to use salt with it, because of the thirst that results from giving big doses of salt.

Ammon. Carb. is regarded by camelmen who have seen it used much for broncho-pneumonia as a specific for that disease. It is a very effective remedy, probably because it assists expectoration—no small matter if you have a neck as long as a camel's. Dose, 4 to 6 drachms, in bolus.

Iron tonics are of decided value in what is usually called "debility" but is more often in the camel, anæmia. Dose as for cattle.

Linseed Oil.—Dose to purge: 2 quarts. On active service it is rather too bulky, and linseed tea can sometimes take its place as a vehicle.

Oil of Turpentine, used with ammon. carb. and linseed oil, cures most cases of tympanitis. Dose: $1\frac{1}{2}$ ozs. or 2 ozs.

Kamala, as a purgative. Dose: 7 ozs. in linseed tea.

Chlorodyne is a good anodyne for camels in pain, and gives good results in practice in doses of 6 drachms to 1 oz.

Strychnine salts are valuable for putting new life into camels that sit down on the march owing to fatigue or sickness; and is a good stimulant in many diseases, the effect of small doses being very perceptible on the pulse. Hypodermically given, dose should be 1 to $1\frac{1}{2}$ grains; never more than this, owing to the varying degrees of tolerance to this drug which camels possess.

Eserine and Pilocarpine, 2 grains of each hypodermically act well; but eserine alone is useless. I have never tried arecoline for producing quick purgation in the camel; very likely it would act better.

Rum is a good general stimulant in collapsed animals which have been exposed to cold rains or cold winds and have difficulty in rising. Dose: 4 ozs., and repeat in 1 hour. I think great benefit results by giving rum or whisky frequently to camels suffering from "stroke," the spinal trouble which sometimes suddenly afflicts camels, and is known as "Hawa," "Shimber," etc., by camelmen.

Potassium bromide, Chloral hydrate, Chloroform, Cocaine, Sodium Bicarbonate, Chiretta, and Catechu are handy drugs.

Externally I prefer the following remedies :—

Taramira oil (called Jambu in Sind), made from *Brassica eruca* in India. This is the best remedy for mange. Failing it, sarson ("sim-sim") oil and sulphur may be used. Lime and sulphur sheep-dip has its use in delaying the spread of mange.

Hydrarg. perchlor. and *Potassium permanganate*, because they are easily carried.

Boric acid, for dry dressings ; *Fuller's earth*, for same.

Cresol, as it keeps flies away from wounds.

Carbolic acid ; Carbolic soap ; Carbolised oil.

Kerosene, used in emulsion.

Boric Vaseline ; Vaseline.

Turpentine.—A little mixed in vaseline is the best protective application for wounds against flies, and as a stimulant to slow-healing, sore backs.

Hydrarg. Biniol. should be available for use as a blister ; *Mustard* ; a little *Tincture of Iodine*, for use in operations ; and *Stockholm Tar*. I have hardly any use for cotton-wool and bandages in camel-practice ; but *tow* and *gauze* are both necessary ; *brushes* for applying pure carbolic, etc., are useful. I doubt if that excellent dressing, Hypochlorous acid, would be much use in hot climates in the open, but have never tried it outside Europe.

Useful Instruments.—In the field most of the ordinary instruments in the veterinary wallet are useful, but a strong pair of dressing-forceps is absolutely essential. The camel veterinary surgeon should also have a large allowance of half-minute thermometers—at least ten or twelve. No Symes' knife will last long in camel work, and a second strong scalpel should be substituted. Besides these, the field-man should have a mouth-gag (the £1 rs. equine one is suitable, which works with a thumbscrew) ; an equine tooth-rasp ; a small saw to use, with one hand, on tushes ; bullet-forceps ; necrosis forceps ; curette ; bistoury ; an equine trocar and canula ; and two pairs of curved scissors. An enema pump is not necessary unless there is sand-colic to deal with.

A small microscope, with two-thirds and one-sixth objectives and No. 4 eye-piece, but no condenser, is essential if any good work is to be done with camels in the field or elsewhere. Messrs. Baird and Tatlock make a very light instrument for £5 complete, and suitable in every way. I have used it in the field under every conceivable condition. Slides and cover glasses, but no stains, are required.

Camel-hospitals ought to have a respectable equipment for micro-

scopic examination of blood ; possibly, also, for cure of trypanosomiasis. Every shape of curette, necrosis forceps, and bone-forceps is useful ; a small trephine ; a "castrator" ; an ecraseur ; tooth-shears : and some line firing-irons.

Œdema in camel-practice.—I purposely omitted the fact that œdema about the belly and pedestal is occasionally met with in trypanosomiasis ; the reason I did so was to impress the fact that it is irregular appetite on the grazing ground which is the characteristic symptom of that disease in camels, and not œdema, which is less seen in this species than in other animals affected with trypanosomiasis. Nevertheless, œdemas do occur in camels with trypanosomiasis, and the most common form is an œdema about the base of the pedestal, the skin pitting on pressure although there is hardly any visible swelling. Œdema in male camels may be found about the lower part of the belly and chest in pneumonia, pericarditis, and pleurisy, or any febrile disease where the heart's action is weak ; sometimes in trypanosomiasis ; sometimes after dressings for mange ; and in Indian camels is generally of pathogenic origin. In Somali camels and others accustomed to live for long periods without water, œdema of these parts is sometimes physiological, and is seen for several days after a big drink following a long period of abstinence from water ; the Somali camel can temporarily store water in the form of visible œdema.

In future articles there will be a short description of the non-contagious diseases of the camel from a comparative clinical standpoint, and of his surgical diseases of all sorts.

(To be continued.)

Translations.

EPIZOOTIC LYMPHANGITIS IN FRANCE: ITS DIAGNOSIS AND TREATMENT.

By J. BRIDRÉ

J. Bridré, writing in *Bulletin de la Société Centrale de Médecine Vétérinaire*, calls attention to a disease rarely seen in France before the war, not well known by a great number of veterinary surgeons, the spread of which is beginning to become rather disturbing. Epizootic lymphangitis has been imported into France by horses from our North African Possessions. It is too soon, and the records fail, to appreciate the gravity of the infection, but, nevertheless, the malady is of a grave character among certain units of the Army, and particular stables are badly infected.

The symptoms are well known : hard, corded and tender lymphatics running towards the glands, which are hypertrophied and

suppurating, beaded, nodular elevations, ulcers with labiate borders, thick and creamy pus.

Malleinisation enables a clinical distinction to be made in the great majority of cases between epizootic lymphangitis and glanders.

But the reactions may be doubtful; the cryptococcus of lymphangitis may be found on lesions simulating the ulcer, due to the bacillus of glanders—in these cases, the clinical elements of differential diagnosis have an originating importance. The aspect of lesions budding at the edges, turned in, rounded, the nature of the thick and creamy pus, make the diagnosis clear, even in ailing subjects where the cords are obscured in a diffuse engorgement, and where the buttons and the ulcers are regularly divided without being disposed in the form of beads. The glanders ulcer is cut out perpendicularly, the ulcer of epizootic lymphangitis is rounded, its edges are thick, and stand out in relief. The lesions of ulceritic lymphangitis have granulating but not inverted edges; they are deep, and exude a yellowish, blood-streaked pus. Their evolution arises from corded lymphatics, never as hard and voluminous as those of epizootic lymphangitis.

The differentiation between sporothricosis and epizootic lymphangitis can only be made by bacteriological procedure; their clinical manifestations are quite similar.

For the rest, sporothricosis is exceptional in France; it is controllable with the same efficacy and by the same treatment as epizootic lymphangitis. Microscopic examination completes the diagnosis. Preparations in the fresh state reveal the cryptococci of epizootic lymphangitis under the form of ovoid bodies, 3 to 4 microns in diameter, free or intracellular, with a very refracting envelope accentuating a double contour; generally they are numerous. Sporothricelium are not without analogy of form to cryptococci, but they have no double wall, they are often rare in the preparations. As between glanders and ulcerous lymphangitis, examination in the fresh state—which is usefully made with a magnifying of 400 to 500 diameters—does not furnish any information. The presence of their agents can only be revealed by colouration or cultures.

Bridré summarises the treatments which have been in vogue for some years in order to avoid the great havoc caused by surgical intervention, often difficult and ineffective (intravenous injections of iodide of potassium, electargol, local injections of tincture of iodine and intramuscular injection of methylene blue.)

Bridré, Négri and Trouette have obtained excellent results from intravenous injections of arseno-benzol. Novarseno-benzol is much more convenient to use, and is quite as effective (Houdemer). Bridré recommends a dose of 2 to 3 grammes dissolved in 20 c.c. of distilled

water. The injection is made in the jugular; one must carefully avoid injecting any of the liquid under the skin. The effects are rapidly appreciable; cicatrisation of the initial lesions, diminution in size of the cords, appearance of fresh buttons, softening and opening of existing ones. Cure is assured at the end of three weeks; if at this period the initial wound has not cicatrised, and the cord persists, one renews the injection.

Cure is aided by opening abscesses, treatment of wounds, cauterisation of granulating wounds. The effectiveness of the treatment is established by a record of nine cases given by the author.—*Revue Générale de Médecine Vétérinaire*. G. M.

TORSION OF THE UTERUS IN A BITCH—HYSTERECTOMY CURE.

By R. CHOLET,

Veterinary Surgeon at Royat les Bains.

THE subject of this note, an active bitch of the smooth-haired variety, aged 4 years, was noticed by her owner at the beginning of September to be pregnant. He was not, however, aware of the date of her conception. About September 13th the mammæ filled. On the 14th the bitch showed at intervals acute pain which continued until the 18th. Appetite lessened. The vulva was not enlarged, nor was there any discharge from it. On the 19th the pains appeared to diminish, appetite somewhat better, but the abdomen was ballooned and sensitive to the slightest pressure. The milk disappeared. On September 23rd Cholet saw the bitch and found her almost prostrate. Membranes very pale, the abdomen very large and painful to manipulation. The left half was particularly distended; vaginal exploration revealed neither discharge nor a foetus. A diagnosis of maternal dystokia with metro-peritonitis was now made. Laparotomy was suggested and undertaken on the following morning, with the aid of Mon. G. Bouchet. Anæsthesia was by means of atropo-morph. et chloroform. On account of the enfeebled condition of the patient an injection of 100 c.c. physiological salt solution was made.

Incision of 15 cm. on the white line. The abdominal cavity being opened there was an escape of sero-sanguineous fluid. There was a localised peritonitis and the omentum was strongly injected. The uterine horn which came first into view was gravid and partially gangrenous and had formed adhesions with all neighbouring organs, particularly the bladder. An attempt was made to disengage these adhesions, and in doing so a finger punctured the horn; through this opening a foetus and foetal fluid was removed. This done, the operation of disentangling the organs was more easily proceeded with, and the

outline of the uterus can be more easily followed. The left horn is seen to be empty. The right encloses two foetuses. It has made a half turn on itself, taking with it by its weight the left in the movement. The body of the uterus has also undergone a half twist, and owing to the close adhesions it had formed, it was impossible to return it to the normal position. Hysterectomy was now performed, the abdomen washed with normal saline, the abdominal wall sutured with silk, the skin with horsehair.

The patient became very cold, explainable by the large surgical wound and the duration of the operation (time occupied not stated). She was placed in a box containing straw and a hot water bottle, and was well clothed. She came round quickly, but is very pale and cold. She received a further injection of 100 c.c. physiological serum with caffeine. On the following morning another injection of 100 c.c. and she is given a little milk and shreds of meat. During the next few days her condition improved. The wound healed partly by first intention, partly by suppuration, because the patient tore off all the bandages. Fifteen days after the operation the bitch was returned to her owner and has since remained in good health.

The author remarks that in all such cases surgical treatment at any stage does not carry with it more risks than waiting treatment, the results of which are so often disastrous. L. V. K.

Recueil de Med. Veter. December, 1916.

Abstract.

VESICULAR STOMATITIS IN THE HORSE.

FROM the "Journal of the American Veterinary Medical Association" we learn that a disease involving the mouths, and more particularly the tongues, of horses and mules, has been found among the animals gathered together at Grand Island, Nebraska, and Denver, Colorado, by the French and English Government agents for shipment abroad.

The contagiousness of the disease necessitated local quarantine, the separation of the sick from the healthy, antiseptic mouth washes, and cleansing and disinfection of pens.

The disease spread to cattle, and foot-and-mouth being suspected, the usual precautions were taken. Vesicles and blisters forming erosions, chiefly on the tongue and occasionally involving the rest of the mouth or muzzle, are the prominent symptoms.

No soreness in the feet of any of the subjects attacked was noted. Hogs exposed to infection did not contract the disease, sheep also were immune.

There was local, but no systematic infection and rise of temperature as in foot-and-mouth. Passage of the disease through calves did

not increase its virulence as is the case in epizootic aphtha. Vesicular stomatitis closely resembles foot-and-mouth disease—more closely, it is written, than mycotic or necrotic stomatitis.

Reliable diagnosis is only made by experimental inoculation and observations over a number of days.

It is suggested that horses be added to the experimental animals (calves and hogs) inoculated with suspected material, in order to differentiate between this malady and foot-and-mouth. We are informed that this ailment has also been recently recorded as "Erosive Stomatitis" by Monsieur Jacquoulet, in France.

IN a recent letter from Dr. D. M. Campbell, editor of the "Amer. Jour. of Vet. Med.," an interesting remark occurs. He writes, "Thanks to the army veterinary legislation which the last congress enacted into law, the veterinary profession in America will be in a much better position to render effective service to the military forces than it would have been at any time heretofore, and it is believed, should hostilities actually break out, that an independent veterinary corps of the Army will be quickly formed. The present veterinary department is nominally under the direction of the medical corps, although in reality it is essentially independent."

Correspondence.

SNORING IN CATTLE.

To the Editor of THE VETERINARY JOURNAL.

DEAR SIR,—In your issue of January of this year, I notice an article by Mr. J. H. Parker on "Snoring in Cattle." Just a generation ago, when I was a pupil with Mr. Jos. Donald, of Wigton, this disease was very prevalent, and for the last thirty years I have been treating it in the fashion he taught me. The process is as follows: Two men catch hold of the patient, the man on the left side putting his right arm down between the horns and catching the nose with his right fingers, while with his left hand he grasps the horn on that side. The other man holds the right horn, both men putting their backs against the animal's shoulders. The operator then grasps the tongue in his left hand, using a rough cloth, and runs his right arm down the throat, turns the palm uppermost, and will find the abscess lying in his hand in nine cases out of ten. I prefer opening the abscess with the finger nail, which can be done in nearly every instance, to using a knife, although I have had a good concealed knife made for the job.* If opened in this way the abscess is not so likely to recur, as one tears it open instead of having a clean cut wound, which may heal too quickly and the abscess fill again. There is little or no risk attending this operation if the men keep the patient's

* If a concealed knife is used it should be lashed round the wrist.

head straight and the operator is quick on his feet. In smaller cattle it is necessary to use a long hooked knife as the throat may be too small for the hand and arm. I have done probably a thousand cases like this, and can speak from experience. If the abscess is not ripe it is better to blister the throat and wait a week or so.

I get your journal here every month and pass it on to some of my American friends. I am here doing remount work.—Faithfully yours,

E. C. WINTER, F.R.C.V.S.,

Stockyards Hotel,

Indianapolis, Ind., U.S.A.

February 24th, 1917.

Limerick, Ireland.

Board of Agriculture and Fisheries,
4, Whitehall Place, London, S.W.1.
April 18th, 1917.

No. A1554 1917.

To the Editor of THE VETERINARY JOURNAL.

SIR,—I am directed by the President of the Board of Agriculture and Fisheries to inform you that the Board have had under consideration the possibility of attempts being made by enemy agents to spread disease amongst animals by means of infective material. Mr. Prothero therefore considers it desirable that the attention of Veterinary Surgeons should be called to the matter with the view of their making special enquiries in the event of multiple outbreaks of disease coming to their notice, and reporting to the Board any such cases, together with any suspicious circumstances connected therewith.

I am, Sir, Your obedient Servant,

W. H. CHAMBERLAIN (for Secretary).

Reviews.

ANNUAL REPORT OF THE BENGAL VETERINARY COLLEGE AND OF THE CIVIL VETERINARY DEPARTMENT, BENGAL, FOR THE YEAR 1915-1916.

LIEUT.-COL. A. SMITH sends us this Annual Report. Whilst Principal of the College and Superintendent of the Civil Veterinary Department during the year, good and valuable advance has been made. Seventy-one students went through the full College course, all of them attended riding classes, and six secured prizes for equitation; 30 students attended a special course of lectures on the infectious diseases of cattle. The College lost a very competent bacteriologist by death in the person of Mr. S. N. Mitra, but Mr. D. Dey took up a large part of the work, and the Raymond Research Laboratory had a busy year of examinations and investigations. Infectious diseases were illustrated by a series of lantern slides, and the demonstrations thus made more interesting. Experiments were made with an auto-vaccine in cases of mammitis. During the year 2,810 patients were treated and 1,246 operations performed; 523 animals were sent to the College hospital by the magistrates trying prosecutions under the Prevention of Cruelty to Animals Act. Mr. R. V. Pillai, a member of the College staff, volunteered as a

veterinary supervisor in charge of animals on transports sailing from Bombay. He did his duty well and his services were much appreciated. Glanders, surra, rinderpest, anthrax, and rabies were well looked after by the Epizootic Diseases of Animals Department, Calcutta.

The Civil Veterinary Department suffered somewhat from changes due to the war. Mr. P. J. Kerr, I.C.V.D., took a commission and was appointed to the Indian Army Reserve Officers, and Mr. A. D. McGregor also joined up.

A native superintendent was appointed under Lieut.-Col. Smith, and the work of the department was carried on. Contagious diseases in horses and cattle diminished as regards cases, and the number of outbreaks was fewer. Rinderpest, hæmorrhagic septicæmia and foot and mouth disease caused the most fatalities. The inoculations against rinderpest were 38,950, and against hæmorrhagic septicæmia 2,029, and, as usual, vast distances were traversed and numerous journeys undertaken by the veterinary staff. The established local hospitals and dispensaries did good work. The report is a record of full activity in a wide field.

G. M.

L'ABATTOIR MODERNE, 2nd edition, by Dr. A. Moreau, Senior Veterinary Surgeon, Chief Inspector at the Abattoirs of La Villette, Paris.

The second edition of "L'Abattoir Moderne," by Dr. A. Moreau, is a book compiled by a master, well written and containing all the up-to-date information concerning improvements in the construction, mechanism and installation of refrigerating appliances which an establishment ought to possess to fulfil all the exigencies of hygiene, and to facilitate sanitary inspection. The book will not only interest architects, engineers, and contractors who desire to know the special rules of modern abattoir construction, but also municipal authorities, veterinary inspectors, health administrations and commissions, councils of hygiene, veterinary teachers—in a word, all those who are interested in perfect installation, examination, and administration in the abattoir. A historic sketch shows us how the modern abattoir is necessary for the defence of public health against the transmission of certain diseases common to men and animals, and against intoxications caused by the consumption of diseased meat. The discoveries of Pasteur and his school have, above all, given a manifest importance to the sanitary inspection of abattoirs. After a timely criticism of the French abattoir, the author passes foreign establishments in review. Afterwards he indicates the general conditions of construction of the modern abattoir, and makes a detailed study of the cost of construction and of the ways and means to be adopted to produce a complete abattoir. Nine typical plans of abattoirs in different important towns are reproduced in the text, and are applicable to the needs of these localities. The slaughter houses of the butcher, the pork butcher, and the horse slaughterer are described very minutely with all the appurtenances and utensils.

The tripe room is equally well discussed. The comprehensive chapter on the preserving room and the installation and equipment of the cooling

room gives a good idea of the necessity and economy of the system. The cattle, sheep, and pig pens, as well as annexes, the cattle market, and industrial annexes for dealing with skins, tallow and fat, are discussed in two chapters.

The last part of the work is devoted to the general administrative and sanitary services. The different taxes and tolls applicable are successively examined.

The technique of veterinary inspection is also explained without describing the lesions and alterations which justify seizure. Special works on veterinary science must be consulted on questions of pathology, parasitology and microbiology.

In this second edition the author has examined some new questions and modified certain others, notably:—

The account of the results obtained in recent years in the renovation of abattoirs; the question of regional and industrial abattoirs; the statistics of French abattoirs for the veterinary departments.

The average rates (noting area, price of construction, etc.) which the modern French abattoirs produce; the modernisation of old abattoirs; the cooling and freezing rooms (preparation of meat, arrangement, refrigeration, and working of freezing apparatus).

The biological purification of residuary fluids; the different taxes of abattoirs and their institution; the attributes of the supervisor; veterinary control, etc.; the regulations involving seizure, the legality of seizure; the processes of sterilisation and destruction of meat; model and typical regulations to be applied in the abattoir.

This book, patronised by the Academy of Medicine and by the National Society of Agriculture, constitutes, with its 279 plans or figures, a work which has the merit of uniting in a single volume all that ought to be known on the construction, installation, work and administration of an abattoir, and of presenting all this information in a clear and methodical form. One sees in it the work of an enlightened practitioner who thinks and writes as a practical man.

GEORGES MAQUIGNY.

23 rue de la Tannerie, Abbeville, France.

NOTICES.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone: 4646 Gerrard. Telegrams: "Baillière, Rand London."

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THE LATE CAPTAIN H. ANTHONY, A.V.C. (T.F.)

(Killed whilst on Active Service)

THE VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING;
MAJOR IN THE ARMY VETERINARY CORPS, AND FORMERLY PROFESSOR IN
THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

JUNE, 1917.

Editorial.

OUR RESPONSE TO THE PRESSING NEED A.V.C.

VETERINARY SURGEONS under fifty years of age are most urgently needed for Temporary Commissions in the Army Veterinary Corps for service at home and overseas.—For particulars apply to Director-General Army Veterinary Service, 16, Victoria Street, London, S.W.

Again and again, in accordance with the habits of our voluntary system, the above advertisement appears in all our professional journals. Now that the younger men have gone the older ones *must*, in their turn, step into the breach.

England needs them, or she would not ask for them; and have them she must, by hook or by crook. It is in accordance with our old belief that "one volunteer is worth two pressed men," that the game has been allowed to go on so long, in our department as well as in others of our citizen army, but if the voluntary system cannot supply the pressing need, the methods of the press gang must be put into force.

The fact of the age limit being raised to 50 demonstrates beyond question the fact that our supply of veterinary officers is strained to the uttermost—or is it that we have not been loyal enough and willing, each in his turn, to sacrifice something for the Motherland?

It is, of course, possible that even yet in some parts of Great Britain and Ireland it is not realised that a war is on, and, judging from the conversations of some who return from leave this belief is justifiable. Certainly until a year ago this thought was often present

and much discussed. "Under 50" means that men of mature judgment can have positions found for them in which their services to the nation are of the greatest value. In hospitals, in remount depots, on transport and other special work, where dozens of professional men are needed, they can vie with the younger man in doing good work, and set him free to take the great physical hardships for which he is better fitted.

"Most urgently needed" is not an expression which would be used by such a proud body as the War Office without reason, and that the need is there should be taken for granted in consequence.

The need is there, England's pressing need, and it is not for us to count the cost to ourselves personally. Pride in being physically able to obey should be the dominating feeling of everyone, and, given the officers to work with, it remains but for the "powers that be" to distribute them sensibly and usefully to the best advantage. France and Germany have not had so much patience with the profession, and England can't afford to wait much longer. If voluntary measures fail, then pressure *must* be brought to bear.

INTERMEDIARY AGENCIES IN THE SPREAD OF CONTAGIOUS DISEASES.

It is well known that contagious diseases are spread by intermediary agencies quite as readily as by actual, direct contact, and it is not always easy to trace up the transmitting agent.

It is not necessary, in order to keep a disease in a stable, for the transmitting agent to be a horse only, a man can carry it from place to place, and stall to stall.

One does not always, however, think to associate mice and rats with the spread of mange, as they are not animals to which a horse takes naturally; but a case detailed by a correspondent in this month's number clearly proves that mice can catch horse mange, and there is no doubt that mice and rats are responsible for the prolonged period over which some stables will be infected.

In fact, owners of large studs of horses, especially contractors, have often stated that the only way to get rid of mange from a stable is to burn the place down.

One authenticated observation, whether clinical, bacteriological, or of any other branch of veterinary science, is worth a thousand theories, and practitioners who will take the trouble to record their experiences and clinical observations are performing a service to their fellow members (especially the young and inexperienced ones) and conferring a boon which helps to establish self-confidence, and so to help forward the progress of the profession to which our lives are devoted.

PLATE I.

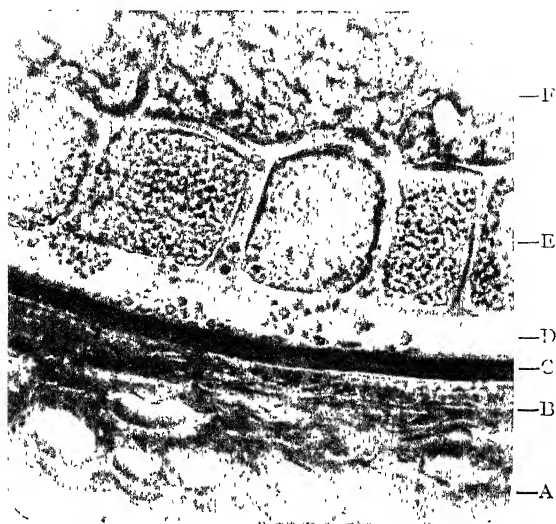
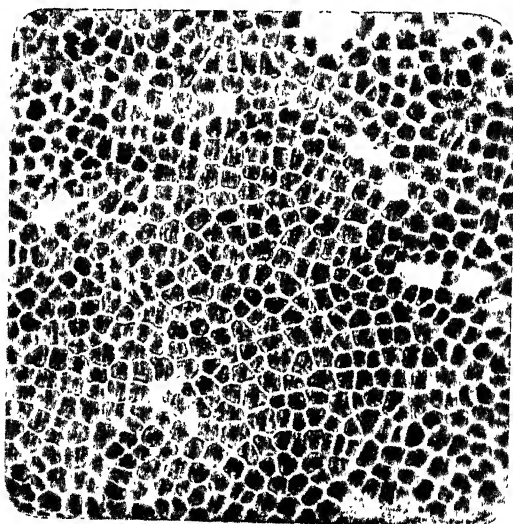


FIG. 1.—Cross section through wheat bran
 A.—B. Pericarp C Spermoderm, pigmented
 D. Perisperm or hyaline layer, showing some displaced cell
 contents from the vitamine layer
 E. "Aleurone" or vitamine layer of endosperm.
 F. Adherent starch grains of endosperm.
 × 400.



Wheat Bran.
 FIG. 2.—Surface view of vitamine layer.
 × 75.

Original Communications.

THE DIETETIC VALUE OF WHEAT BRAN.

BY R. G. LINTON, M R C V S., Professor of Hygiene, and W. S. PETRIE,
Royal (Dick) Veterinary College, Edinburgh

THE wheat grain consists of an outer skin or pericarp, a germ, and an endosperm. The germ or embryo plant forms about 1.5 per cent. of the entire grain, and is rich in protein and oil. It is removed in the milling process, as the oil becomes rancid in stored flour, and as a by-product is sold as food for pigs and cattle, or is made into proprietary anti-diabetic foods for human consumption.

The endosperm forms the bulk of the kernel and accounts for about 92 per cent. of the whole grain. Originally intended merely as the food-store for the embryo plant, it has been increased in size by selective growth. It is composed of a network of parenchymatous cells containing gluten and starch grains. On its surface is a layer of thick-walled cells, which are densely packed with protein or "aleurone" grains (Fig. 1); each cell contains a single large nucleus which is rich in organic phosphate.

This layer of cells has been named the "cerealine," "gluten" or "aleurone" layer. Owing to the fact that the vitamins are largely located here, Johnson (1) suggests that this most important cell layer be called the *vitamine layer* in preference to the older names, which are misnomers. This single layer of cells is, as Professor Johnson says, "the richest part of the whole food-bag."

The skin or pericarp consists of 6-8 rows of cells (Fig. 1), two of which are pigmented and give to bran its distinctive colour. The cells are exceptionally tough, and therefore resist digestive processes.

In the milling of wheat the cleaned grains are passed between a series of paired rollers, which break the grain into pieces, flatten out the germ, tear off the pericarp, and finally grind the broken grain into flour. During the milling process, and after each "break," the crushed grain, skin, and germ are separated by sieving.

Although the *vitamine layer* is a part of the endosperm, in ordinary milling, even with modern machinery, it is not possible to remove the pericarp without taking with it this valuable layer. Thus "bran" consists of the tough pericarp plus the richest part of the food-bag, the *vitamine layer*. It is to the presence of this *vitamine layer* that bran owes its unquestionable dietetic value.

The object of the miller is to remove the skin of the wheat with as little flour adherent as possible, and the present-day bran, the first offal to be removed, has very little starch attached to it when produced in a modern mill.

As the grains are broken and the bran is removed, portions of the

latter remain adherent to the endosperm, and are subjected to further grinding and sifting, and are separated, together with an amount of adherent flour, as sharps or pollards, a finer offal than bran. Further grinding and sifting separate in turn coarse middlings, or fine sharps, and the fine middlings. (The grading and naming of wheat offals are very confusing; for elucidation readers are referred to the *Journal of the Board of Agriculture*, March, 1917.) In passing it may be mentioned that 11 per cent. of the wheat offal is now included in the Government Regulation Flour, so that the percentage of flour obtained from the entire grain is increased from 70 per cent. to 81 per cent., and to which is now added 5 per cent. of maize, beans, or rice. The addition of beans would be the most beneficial from the point of view of increasing the dietetic value of bread.

In rejecting the germ and the bran, the miller, as Hutchison says (2), "discards some of the most useful chemical constituents of the wheat, for with the germ protein and fat are lost, and with the bran, mineral matter and the protein contained in its layer of aleurone cells." The bran is removed because it is a difficult matter to grind it sufficiently small for human digestion to be effective. It is well known that wholemeal bread, which contains the bran, is less readily absorbed by people than is ordinary white bread from which the bran has been separated. The exceptionally tough cellulose is not only itself indigestible, but is credited with retarding the digestion of the starch with which it is mixed. Hutchison says (2) that Giraud has demonstrated unchanged "aleurone" cells in the human excreta, and the same author quotes Rubner's statement that only one-third of the nutriment contained in bran is capable of being made use of by the human digestive organs.

The question then arises: What is the dietetic value of wheat bran to animals? That those who are associated with the feeding of animals are not of one mind as to the nutritive properties of bran is evident. Agriculturists, or rather those agriculturists who are interested in animal nutrition, have accepted Kellner's assessment, which is that 1.36 lb. of wheat bran is equivalent to 1 lb. of oats for the purpose of producing bodily increase in mature oxen. If proof were needed that Kellner's valuation is not too high, it is to be found in the results of the two experiments conducted by Bruce (3, 4), which will presently be reviewed.

Though agriculturists have freely accepted Kellner's valuation many veterinary practitioners refuse to do so, and condemn bran in no uncertain tones. Most emphatic in this condemnation among British veterinary writers is Smith (5), who goes so far as to say that "as a food it is useless, in spite of its chemical composition," and

again, "bearing in mind that it (bran) has no nutritive properties, the interior should not be burdened with it unnecessarily." Even as late as 1912 he evidently saw no reason to modify his views (6). It is evident that Smith's dictum has been responsible for much misunderstanding as to the real nutritive value of bran, and many have accepted his teaching without themselves considering its validity.

Opinions as to the food value of this wheat offal are obviously at variance. While some claim for it a value in excess of its true worth, others decline to admit that it has any real nutritive properties.

Some idea of the magnitude of the interests involved may be gathered from the figures published by the Board of Agriculture and Fisheries (7), showing the quantity of wheat offals produced in Great Britain.* In 1907 the amount of all wheat offals is given as 35,441,000 cwt., of which only a small proportion was exported. The increase of consumption of wheat offals in Great Britain since the declaration of war is shown from the following figures. The exports of bran and pollards for the twelve months preceding August, 1914, were 2,294,750 cwt. and of sharps and middlings 95,333 cwt. The exports for 1915 were: Bran and pollards, 53,000 cwt., and sharps and middlings, 11,000 cwt. As the home production of wheat offals (prior to the flour regulation) has probably not varied more than 1 per cent. to 2 per cent. either up or down since 1914, it may be assumed that approximately an additional 2,326,000 cwt. of wheat offals are now consumed in this country.

Wheat bran has the following percentage chemical analysis: Crude protein, 14; fat, 4; carbohydrates, 55; crude fibre, 10; and ash, 5. On its analysis one might expect that the dynamic value of bran would be about 7 per cent. less than that of oats, but Kellner has shown (8) that the production value of such by-products is considerably less than one would suppose from a mere examination of their analysis, and he therefore gives to bran a "value number" of 77, as compared with one of 95 for oats.

The production starch equivalent of bran, according to Kellner's theory, is about 30 per cent. less than that of oats when fed to cattle. Owing to the character of the cellulose it is not improbable that bacterial decomposition to a certain extent replaces true digestion, and it may be expected that bran gives the best results when fed to animals having relatively high cellulose digestive powers. Thus, as nutriment for fattening swine, bran has not been found to be satisfactory. The modern pig requires food which is rapidly digested, and, like human beings, has little power to digest cellulose. On the other

* For assistance in obtaining this information we are indebted to the Board of Agriculture for Scotland.

hand, the finer wheat offals give good returns. Bran is more suitable for brood sows than for fattening pigs, but, if fed continuously, lime in some form should be given with it.

In 1911-1912 Bruce (3) tested the increased production value of medium wheat bran. Twenty-eight 2-year-old bullocks were given a basal ration of 90 lb. turnips, 12 lb. oat straw, and 4 lb. cotton cake; to half of the cattle were given 4 lb. linseed cake per head daily, and to the other half an average of 4.7 lb. medium wheat bran per head daily. The bran was fed dry. At the termination of the experiment, which lasted 112 days, it was found that the linseed-cake-fed lot had gained an average of 2.25 lb., and the bran-fed lot an average of 2.02 lb. per head daily. The bran-fed lot received, according to Kellner's method of valuation, .8 lb. P.S.E. less per head daily than those on linseed cake. In 1912-1913 Bruce (4) conducted a further experiment in which linseed cake and bran again figured as two of the food-stuffs tested. As an addition to the basal ration one lot of cattle received 3.95 lb. linseed cake daily per head, and another lot 5 lb. of bran. The average daily gain for the cake-fed bullocks was 2.033 lb., and for the bran-fed cattle 2.009 lb. per head. The increase was, therefore, practically identical. The bran-fed cattle received .49 lb. P.S.E. less per day than did the cake-fed animals. Bruce, therefore, shows that wheat bran, for the purpose of fattening cattle, has a slightly higher value than has been ascribed to it by Kellner.

As a concentrate for milch cows bran is held in high esteem. The slight laxative effect which it has, together with its protein and phosphoric acid content, make it eminently suitable for this class of animal. As cows continue to excrete calcium in their milk, irrespective of the amount given in their food, bran should not form too large a proportion of the daily ration unless it is combined with foods rich in lime, such as bean meal for a concentrate, or a leguminous straw for roughage. Any bad effects of continuously giving to cows food containing a low proportion of calcium may not be readily apparent, but a constant drain of calcium from the system could not fail to have deleterious effects upon the offspring. Such nutritional deficiency would be shown in physical deterioration, and a lessened resistance to disease. The possible connection between calcium deficiency and tuberculosis has been hinted at.

Bran has never been used extensively for the feeding of horses in this country, and it is chiefly given for its laxative effect, or because, owing to its light, chaffy nature, when mixed with oats, it prevents horses from bolting this grain. Bran in the form of a mash is a favourite diet for sick horses, for which purpose Smith recommends it. Its laxative effect is here beneficial, and fresh bran when steamed

gives off an appetising odour which is tempting to a delicate palate. Moist, steamed food is appreciated by fevered animals, and is more suitable for them than dry food. Nevertheless, all scalded food is less digestible than dry food, and the nitrogenous constituents of bran are 7 per cent. less digestible when steamed than when dry.

Henry and Morrison (9) consider bran a useful food for the horse, provided that, owing to its bulky nature, the amount is limited for hard-worked horses. They consider that, when low in price, bran may be profitably fed in larger amounts as a partial substitute for oats.

Feeding trials of bran with horses have been carried out by Burket (10) and by Shepperd (11). Burket fed two working horses a ration of 7 lb. oats, 7 lb. maize, and 12 lb. timothy hay, while with two other horses 7 lb. of bran replaced the oats. After repeating his trial Burket concluded that when given in this combination bran can replace an equal quantity of oats.

Shepperd in 1894 tested the feeding value of oats against equal parts of bran and shorts (ground grain sifted finer than bran) for working horses. Prairie hay was given for roughage. Eight working horses and four mules were utilised, and a careful record was kept of the number of hours each animal worked. Shepperd's report shows that there was little difference between the two rations, and he concluded that equal parts of bran and shorts, weight for weight, is nearly equal to oats for working horses.

It is difficult to assess the nutritive value of the shorts used in this test, as no analyses of the foods are given, and the composition of "shorts" is variable. It is probable that the starch equivalent of the combination is about 10 per cent. less than that of oats.

During a period of fifteen consecutive months the Cleansing Department of the City of Edinburgh Corporation tested the value of wheat bran as a substitute for a portion of the ordinary feeding. To Mr. John Gibson, Inspector of the City Cleansing Department, we are indebted for kindly placing at our disposal all the records connected with the trial. Twenty-nine horses were used for the test, but as some of these were fresh purchases and showed an increase of weight during the period out of proportion to the mature animals, and some were resting for varying periods for lameness or for other causes, we have utilised only the records of twenty mature horses, which worked throughout the entire period. Eleven of the animals were on the "bran ration" and nine on the "ordinary ration." The ordinary feeding was not the same throughout the whole period. For the first eight months ration "A" was given; that is, from the beginning of February, 1913, to the end of September, 1913, when ration "B" was substituted up to the end of the test in April, 1914. Though the

horses naturally received less food on Sundays, we have taken the daily ration as one-seventh of the total weekly ration, as follows :—

Special Feeding.		Ordinary "A."		Ordinary "B."	
Hay	13.4 lb.	Hay	14 lb.	Hay	16 lb.
Oat straw	3.85	Oat straw	4	Oat straw	5
Bran	8.5	Bran	2	Bran	2
Oats	8.5	Oats	8.75	Oats	10.2
		Beans	2	Beans	2.1
		Maize	1.6		

It will be seen that 6.5 lb. bran replaced a certain quantity of oats, maize, and beans.

The average weight of the eleven horses at the beginning of the test was 1,533 lb., requiring, therefore, 10 lb. of maintenance starch equivalent; the average weight of the nine horses on the ordinary diet was 1,657 lb., requiring 10.6 lb. of maintenance starch equivalent.

In order to effect a comparison between the productive values of the two rations the maintenance portions of each must be stated separately, since the requirements for the two lots were different. To simplify comparison, the bran in the ordinary rations and an equal quantity in the special ration have been placed in the maintenance portion of the diet, thus leaving an additional 6.5 lb. of bran to be balanced against the foods given to the other lot of horses. The rations may be expressed as follows :—

<i>Special Feeding</i> —			Starch Equivalents.	
Foodstuffs.			Maintenance.	Production.
Hay	..	.. 13.4 lb.	6 lb.	—lb.
Oat straw	..	.. 3.85	1	—
Bran	..	.. 2.0	1.18	—
Oats	..	.. .75	.43	—
Bran	..	.. 6.5	1.1	2.73
Oats	..	.. 7.75	.46	4.50
			<hr/>	<hr/>
			10.17 lb.	7.23 lb.
<i>Ordinary "A"</i> —			<hr/>	<hr/>
Hay	..	.. 14 lb.	6.3 lb.	—lb.
Oat straw	..	.. 4	1.1	—
Bran	..	.. 2	1.18	—
Oats	..	.. 2.25	1.44	—
Beans	..	.. 2	.20	1.3
Maize	..	.. 1.6	—	1.23
Oats	..	.. 6.5	.39	3.77
			<hr/>	<hr/>
			10.6 lb.	6.3 lb.

Ordinary "B"—

Hay	..	..	16 lb.	7.2 lb.	— lb.
Oat straw	..	..	5	1.35	—
Bran	..	..	2	1.18	—
Oats	..	..	10.20	.61	5.91
Beans	..	..	2.1	.21	1.38
				<hr/> 10.55 lb.	<hr/> 7.29 lb.

In the maintenance portion of each ration there is approximately 1 lb. of digestible protein.

Having satisfied the maintenance requirements as shown, the surplus nutrients available for work for each lot may be compared. The horses on the bran ration received .44 lb. P.S.E. more per head daily than did those on the ordinary rations, a difference which is insignificant, and which does not materially alter the starch equivalent of bran.

After fifteen months the horses on the bran ration had increased in weight an average 8.95 lb. per head, while the average gain per head for the animals on the ordinary food was 16.8 lb. The weight increment for each lot is so small as to be negligible, and little importance can be attached to it, because an examination of the individual chart records shows that there was considerable fluctuation in weight throughout the period for each horse. The exclusion of any one animal might materially alter the relative gains. Indeed the degree of fluctuation is such as to leave one in doubt as to the value of feeding experiments on working horses where fine conclusions are drawn. So far as it is possible to estimate from a test of this character, where the animals are not worked in pairs or teams the work done was similar for each horse.

In the middle of April, 1913, six 6-year-old horses were added to this stud, and were put on the bran ration. Three of these animals worked the entire period of thirteen months, and three were rested at different times and for varying periods for minor ailments. The horses which worked without a break gained in the thirteen months an average of 205 lb. per head, or 16 lb. per month. It is not certain that these horses had reached their maximum of increment, as the chart records cease before this could be determined.

The broad results of this test are that all three rations were suitable for the horses for the work they had to do, inasmuch as the weight of the animals was the same at the end of fifteen months as at the beginning. According to the starch equivalent theory, the two lots of horses received practically the same amount of available nutriment, and one is justified in assuming that the fat production

value which Kellner gives to wheat bran also applies to the horse for the production of external work, though Kellner himself considers that "bran and feeding meals" are more suitable for fattening purposes than as food for working animals. The weight increment of the young horses, taking into consideration that they did continuous, though probably not hard work, is further evidence that Smith's opinion of the nutritive properties of bran is an erroneous one.

An example of heavy feeding and of a ration containing an unusually large amount of bran is furnished by a firm of millers. The average weight of the stud of nine horses is approximately 15 cwt. and one-seventh of the weekly ration is as follows: Cut hay, 5.7 lb.; long hay, 7.7 lb.; broad bran, 15.4 lb.; sport oats and barley, and small wheat, 17 lb.; and treacle, .85 lb.

Allowing 11 lb. of starch equivalent for maintenance, containing a minimum of 1 lb. of digestible protein, the daily ration may be expressed thus:—

				Starch Equivalents.	
Foodstuff.				Maintenance.	Production.
Hay	..	..	13.4 lb.	6.03 lb.	— lb.
Bran	..	..	5.0	2.95	—
"Oats"*	..	..	17.0	1.26	9.86
Bran	..	..	10.4	1.7	4.4
Treacle	..	..	.85	—	.4
				<hr/> 11.94 lb. <hr/>	<hr/> 14.66 lb. <hr/>

Since a minimum of 1 lb. of digestible protein must be included in the maintenance portion of the ration, in this particular diet there are allotted more heat units for thermic purposes than would appear necessary.

It will at once be apparent that this ration supplies an exceptionally large amount of nutriment, even for heavy horses doing very hard work. The dynamic portion will yield sufficient energy for 257,000,000 ft. tons of work. The oats, hay, and treacle, without any of the bran, will supply net energy capable of performing approximately 11,000,000 ft. tons of work, which is only about 200,000 ft. tons less than the maximum work which Smith considers horses are capable of doing (6). Other writers, however, place the maximum amount of work at 16,000,000 ft. tons, or even higher.

Even supposing that these horses expend the maximum amount of energy which is possible for horses of this class, there is still a

* For the analysis of this mixed food-stuff on which the starch equivalents are calculated we are indebted to Professor Gemmel, F.I.C.

balance of nutriment which will not be required for the performance of external work. It is, therefore, not possible to deduce the dynamic value of bran from the ration here given.

It may be added that the horses as one would expect, carry an abundance of flesh, and newly-purchased animals quickly gain in weight. The horses work well, pull heavy loads, and do not sweat at their work, or show any indication of softness. The veterinary attendant reports that their health is constantly good, and that digestive troubles are rare.

This ration provides convincing evidence that no harmful effects ensue from feeding to horses large quantities of bran.

It is of interest to know if the cell contents of the vitamine layer are digested to any extent in the small intestine of the horse, or if the bran particles are carried on to the large bowel before undergoing any marked change. Thanks to the courtesy of the Secretary and of the Superintendent of the Scottish Zoological Park, we were able to investigate this point.

Five horses, which were destined for slaughter, were fed 4 lb. of bran daily, in addition to coarse fodder. Each animal was killed at the end of 14 days, and portions of the visceral contents were removed for microscopical examination. Four of the horses had a final feed of 2 lb. of bran three hours before death, and the fifth eighteen hours previous to slaughter.

In each instance it was found that the cell contents had undergone considerable change in the initial portion of the small intestine. In the ileum, close to its junction with the cæcum, digestion was far advanced, many of the cells being quite empty. Nevertheless, a few particles of bran, apparently but little changed, were recovered from the cæcum of each horse, and occasionally similar fragments were found in the first portion of the colon. From the stomach of the horse which was killed 18 hours after its last feed, bran was recovered which showed remarkably little alteration. From this same animal fragments were found in the ileum and cæcum in much the same state as that found in the horses more recently fed.

It may be surmised that in each case the bran which was recovered from the ileum and large bowel had been there for at least eighteen hours, though that in the first part of the small bowel had probably found its way there after the morning feed, and had been lying in the stomach overnight.

It is interesting to note that, though it is not a difficult matter to separate the vitamine layer from the contiguous perisperm in the laboratory, the two remain adherent until the cæcum or, in some cases, the colon is reached.

As a general statement, it may be said that once in the cæcum the vitamine layer is lost sight of, with the exception of some odd fragments of bran. The "aleurone" grains, to a large extent, disappear in the ileum, leaving their containing cell walls but slightly distorted, as is shown in Fig. 4

It is generally accepted that, if bran is treated with boiling water and made into a mash, it has a laxative effect when fed to animals, and that, conversely, it has rather the opposite tendency when given in its natural dry state. For a long time it was thought that the laxative property was due to a supposed mechanical irritation of the flakes on the intestinal mucous membrane, and this opinion is still held by a number of people connected with the feeding of animals. It is difficult to understand how this idea originated, because histologically there is nothing suggestive of mechanical irritation. Bran possesses no real irritative properties, but where the amount of coarse fodder is insufficient to cause an optimum distention of the bowels—a rare condition in animals—large quantities of bran would mechanically supply the necessary stimulus, but not a stimulus due to "irritation." It is, furthermore, difficult to follow the reasoning which, attributing laxative property to mechanical irritation, says that when the irritating substance is fed dry it has, if anything, a soothing effect, and if fed moist after the cellulose has been softened with water, is irritating. This reasoning is inconsistent, and the admitted laxative effect of bran must be due to some other cause than mechanical irritation. Henry and Morrison (9), discussing the laxative effects of bran, refer to the finding by Hart and Patten (12) of an organic compound in bran containing phosphorus, magnesia, and potash—phytin—and mention its laxative property. Hart and Patten have shown that practically all the soluble phosphorus of wheat bran is of an organic nature, and that the organic compound exists in the bran as a magnesium-calcium-potassium-salt of a phospho-organic acid. The free-acid corresponds to Posternak's phytic acid.

Jordan, Hart and Patten (13) have demonstrated that phytin can be completely, or almost completely, removed from bran by mere washing, but more easily by allowing the bran to undergo a slight acid fermentation, followed by leaching with water. Experimenting on two cows they proved that phytin has a definite laxative effect. They fed to a cow a ration containing 10 lb. of natural bran and when this was suddenly substituted by phytin-free bran the animal became seriously constipated and a purgative had to be administered. When the change from unwashed to washed bran was made gradually, there was no evidence of serious disturbance of health or appetite, but the fæces became darker in colour and drier. With the removal

PLATE II.

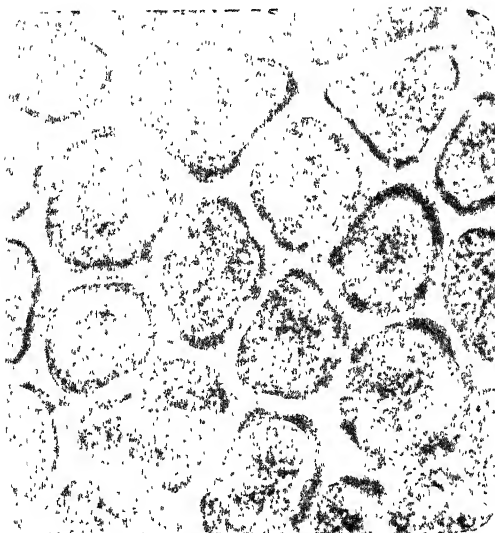


FIG. 3.—Surface view of vitelline layer.
Brachymeria recovered from stomach 3 hours after ingestion.
× 400.

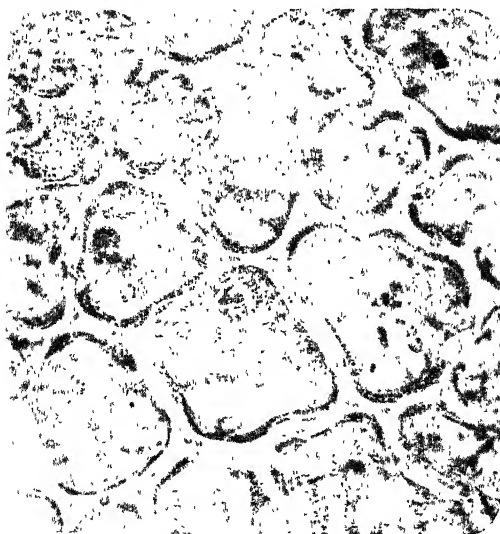


FIG. 4.—Surface view of vitelline layer.
Brachymeria recovered from ileum 18 hours after ingestion.
Note the distorted and almost empty cells.
× 400.

of the phytin, the quantity of the urine was diminished, and it was also found that the leached bran was less digestible than natural bran. These investigators state that the laxative influence of phytin seems well established, as it did not appear probable that in washing the bran other compounds of a laxative nature were taken out. Leaching removes the greater portion of magnesium and potassium compounds, but very little of the calcium compounds, and after discussing the possible effects of the magnesium compounds, it is suggested that phytin exerts specific physiological influences.

The presence of phytin in bran was confirmed by Anderson in 1915 (14), who refers to the finding of the wheat enzyme "phytase" by Japanese workers (15), with confirmatory results by Plimmer (16).

The enzyme rapidly hydrolyses phytin, with the formation of inosite and inorganic phosphoric acid.

Anderson demonstrates that the action of phytase upon phytin proceeds in several stages, and while only a portion of the phytin is completely decomposed into inosite and phosphoric acid, all the phytin is partially hydrolysed, with the formation of lower phosphoric esters of inosite and inorganic phosphoric acid.

Anderson further states that the formation of these intermediate products is only possible through the destruction of the enzyme before the hydrolysis is complete, and says that the reason for this inhibition is not clear, but that it may be due to the excess of phosphoric acid which is liberated, this presumably under laboratory conditions. The same writer also shows that the enzyme is destroyed by pouring boiling water on the bran, and one may therefore assume that a certain proportion of the enzyme would be rendered inert during the process of making an ordinary bran mash, and that if the hot mash be covered and the heat retained, the destruction of the enzyme would be more complete.

While it is obvious that the laxative property of wheat bran is intimately associated with the organic compound phytin, it would seem that further investigation would be profitable.

The so-called binding effect of dry bran does not in reality exist, and is only noticeable as a temporary phase when first given to animals having slight diarrhoea, when their water allowance is at the same time curtailed. Wheat bran absorbs three times its weight of water, and so would, under such a condition, still further reduce intestinal fluid, and cause the visceral contents to assume a firmer character.

The feeding of wheat bran in any appreciable quantity to horses has from time to time been blamed for causing two pathological conditions, the formation of intestinal calculi, and the appearance

of osteoporosis or Miller's disease. Both of these conditions are said to be connected with the mineral content of the bran. Bran contains about 6 per cent. of ash, which, according to Henry and Morrison, is composed as follows—the mineral content of oats from the same authority is given for comparison :—

	K ₂ O	Na ₂ O	CaO	MgO	Fe ₂ O ₃	SO ₃	P ₂ O ₅	SiO ₂	Cl
Bran ..	1.6	.24	.09	.73	.034	.67	2.95	.03	.09
Oats ..	.56	.23	.14	.20	.038	.49	.81	1.25	.07

Bran is rich in phosphorus and magnesium, and poor in calcium, and it is to the actual high percentage of phosphorus and relative low percentage of calcium that bran is credited with having baneful effects upon the system.

For many years veterinary writers have stated that wheat bran causes the formation of calculi in the intestines of horses fed largely on this offal. Smith (5) considers that the magnesium and phosphorus in bran is in an insoluble form, and that instead of passing out with the fæces, these salts become lodged in the bowel and ultimately coalesce to form a calculus. Smith admits the necessity for the presence of a foreign body, such as a nail or stone, to provide a nucleus around which the salts could become deposited, but goes on to say "that millers' horses had the reputation at one time of being very prone to intestinal calculi, through being fed on sweepings from the mill floor, with which were chips from the grinding stones; the chief cause of their trouble was due to feeding on large quantities of bran, which is productive of calculi from the amount of insoluble salts it contains."

Wallis Hoare (17), discussing the etiology of true calculi, draws attention to the common presence of a large proportion of ammonio-magnesium-phosphate, and quotes Furstenberg's opinion that the phosphorus and magnesium are derived from the wheat bran, the feeding of which Furstenberg regards as predisposing to the formation of intestinal calculi. It is considered that the ammonia which is evolved in the intestines combines with the magnesium phosphate, precipitating the insoluble salt ammonio-magnesium-phosphate. Wallis Hoare further says that, according to Cadeac, the conditions which determine the precipitation of these salts are not yet understood, and the etiology of intestinal calculi is still involved in uncertainty.

The same writer makes the statement that it is well known that millers' horses furnish more cases of intestinal calculi than those engaged in other work, and refers to the supposition that the real cause of the apparent more frequent occurrence of calculi among millers' horses is the inclusion of mill sweepings in the food. A. Rogerson is

quoted by this author as being the first to demonstrate that intestinal calculi are formed round a central nucleus, and that when Rogerson had the oats freed from foreign bodies, such as nails, all causes of calculus formation ceased.

To state that the formation of intestinal calculi is mainly attributable to the free feeding of bran, as Smith does, is to saddle a useful and safe feeding stuff with a fault that it does not possess.

The fault lies, not in feeding foods either actually or relatively rich in certain salts, but in giving that food in a dirty state. Whatever may have been the incidence of calculi among millers' horses at some previous time they are now no more liable to this serious complaint than are the animals owned by other people. If it is true that millers' horses furnished more cases of this trouble than other animals, it must have been due, as has been suggested, to the wheat offal given them being particularly contaminated with grindings from the old-fashioned millstones, and with dirt from the floor sweepings.

It must not be forgotten that the introduction of steel rollers, now in general use in the larger mills, is of comparatively recent origin, and the process of washing wheat is still more recent. It is not improbable that the washing of wheat combined with the elimination of the stone roller reflects largely on the present-day comparative immunity of horses from intestinal calculi. What the incidence of calculi is among horses fed largely on bran obtained by the old method of milling we do not know, but it is common knowledge that intestinal calculus is to-day a rare disease, and at the same time the consumption of wheat bran has increased of late, and especially so during the last three years.

That millers' horses need not suffer from calculus formation even though fed on exceptionally large quantities of bran is shown by the record of the horses referred to on page 192. During the past five years the stud of nine animals have had a daily ration of about 15 lb. of bran per head; for the eighteen years previous each horse received not less than 5 lb. of bran daily. In this period of 23 years one horse died as the result of true calculus formation and this animal has only been on the premises for twelve months.

There is no evidence, either clinical or experimental, to show that wheat bran is the cause of calculus formation, either in the horse or other animal.

A constant supply of mineral substances to the body is necessary for the mature animal as well as for the growing young. Growing animals require and retain a relatively greater amount than do mature animals, in order to meet the need of enlarging structures. With

animals of all ages there is a constant outgo of mineral matter, the result of metabolic processes, and if the supply be kept short of physiological requirements for any length of time, pathological symptoms, such as muscular weakness and nervous disorders, appear.

It is said that (8) death occurs sooner under these circumstances than if no food had been given at all. A deficient supply of calcium or phosphorus compels the animal to draw the requisite amount for physiological purposes from its skeleton, thus leaving the bones in a brittle state. Hart, MacCollum and Humphry (18) fed a cow for 110 days a ration lacking lime. She gave out in milk, dung, and urine, twice as much calcium as she took in in her food; during this period she gave up about 25 per cent. of the lime in her bones.

Of equal importance to the actual quantitative supply is the relative proportion of the salts taken in by the body from the food. Excess of acidity in the food calls for a corresponding liberation of calcium as a neutraliser with consequent calcium deficiency to the tissues which in turn draw upon the bones for their necessary supply, to the detriment of the latter. It is sometimes stated that animals fed liberally upon wheat bran, a foodstuff which is rich in phosphorus and relatively poor in calcium, develop "bran disease" or the so-called millers' horse rickets. Ingle in 1907 (19) attributed the enzootic osteoporosis met with in the Transvaal to rations not necessarily deficient in lime and phosphates, but in which the ratio of the lime to the phosphoric acid is too low.

H. B. Elliott (20), discussing the outbreaks of osteoporosis in Hawaii, shows that the evidence for and against the hypothesis that wheat bran was the cause of the trouble was conflicting, and from his review of the etiological position we must admit that with these particular outbreaks of the disease, nutritional deficiency, or an unbalanced mineral supply could not be held responsible.

So far as the writers know, there is no evidence that gross osteal changes are found in animals in this country in any way attributable to feeding bran or any other food having an unbalanced mineral content. Nevertheless, experimental feeding shows us that harmful results can ensue, and it is advisable for stock-keepers to keep this in mind. Authoritative writers consider that bran is an excellent food, and recommend its use for brood mares and young stock, but with the proviso that lime in some form be added. The practice of giving flaked maize and wheat bran to ewes and lambs, which has been common this spring, is hardly commendable unless the caution above mentioned is heeded.

There need no longer be any query as to the production value of bran for cattle. Bruce has shown that Kellner's opinion is not too

high, and the Scandinavians consider bran equal to oats, weight for weight (21). It is here suggested that Kellner's increase production value also applies to horses for work production, and that if purchased with a view to economical feeding, 1.36 lb. of bran is equal to 1 lb. of oats. For working horses, except possibly farm horses, food-stuffs must be considered on either their thermic or dynamic worth. Purchase on "food units" is misleading.

The chief use of bran for horses would be for those unthrifty, weedy colts, which have mainly subsisted on fibrous dead grasses deficient in vitamins, and excellent results may be looked for if the bran is fresh, and is fed in conjunction with a leguminous straw or inorganic calcium.

REFERENCES.

- (1) The "G. R." Flour. T. Johnson. *Journ. Dept. Agric. & Tech. Instr., Ireland.* Vol. 17, No. 2, Jan., 1917.
- (2) "Food and the Principles of Dietetics." R. Hutchison, 1916.
- (3) "Cattle Feeding Experiments." W. Bruce. *Edin. & East of Scot. Coll. Agric.* Report 27, 1912.
- (4) "Cattle Feeding Experiments." W. Bruce. *Edin. & East of Scot. Coll. Agric.* Report 31, 1913.
- (5) "Veterinary Hygiene." F. Smith.
- (6) "Veterinary Physiology." F. Smith. 1912
- (7) "The Agricultural Output of Great Britain," Cd. 6277. 1912. "Trade of the United Kingdom," Cd. 7968. 1914. Board of Agriculture and Fisheries.
- (8) "The Scientific Feeding of Animals." O. Kellner. English translation by W. Goodwin. 1913
- (9) "Feeds and Feeding." W. A. Henry and F. B. Morrison 1916.
- (10) "New Hampshire Station Bull." 82. (Quoted by Henry and Morrison.)
- (11) "Grain Rations for Work Horses." J. H. Shepperd. *Govern. Agric. Exp. St. North Dakota.* Bull. 20. 1895.
- (12) "The Nature of the Principal Phosphorus Compound in Wheat Bran." A. J. Patten and E. B. Hart. *New York Agric. Ex. St. Geneva, N.Y., Bull.* 250., "A Study of the Metabolism and Physiological Effects of Certain Phosphorus Compounds with Milch Cows." W. H. Jordan, E. B. Hart, A. J. Patten.
- (13) *American Journal of Physiology.* Vol 16. 1906.
- (14) "The Organic Phosphorus Compound of Wheat Bran." R. J. Anderson. *New York Agric. Exp. St. Geneva N.Y. Tech. Bull.* 40. 1915.
- (15) *Bull. Coll. Agric. Tokyo*, No. 7. 1907. (Quoted by Anderson.)
- (16) *Biochem. Journ.*, Vol. 7. 1913. (Quoted by Anderson.)
- (17) "System of Veterinary Medicine." Vol. 2. E. Wallis Hoare. 1915.
- (18) *Wisconsin Research Bull.*, 5; *Americ. Journ. Physiol.*, 1909. (Quoted by Henry and Morrison.)
- (19) "Osteoporosis in Animals." H. Ingle. *Journ. Comp. Path. and Therap.* Vol. 20. March, 1907.
- (20) "Osteoporosis." H. B. Elliot. *System of Veterinary Medicine.* Edited by E. Wallis Hoare, Vol. 2, 1915.
- (21) "Handbok i Utdodringslära." Nils Hansson. (Quoted by J. Wilson in *Journ. Dept. Agric. & Tech. Instr., Ireland.* Vol. 17, No. 2.)

THE INTRADERMAL PALPEBRAL MALLEIN TEST FOR GLANDERS.

By CAPTAIN R. P. HOLMES, M.R.C.V.S., D.V.S.M. (Vict.), N.D.A.
Army Veterinary Corps.

THIS method of applying the mallein test to horses and mules is being carried out on an extensive scale during the present war, and has now become almost universally recognised as the quickest and most convenient method of testing where a large number of animals have to be dealt with; and from my own personal observation and experience in testing many thousands of horses and mules, I am thoroughly convinced that when carefully carried out it is the best method, for on more than one occasion it has proved itself a more delicate test than the usual method of hypodermic injection with the ordinary mallein in the neck.

APPARATUS REQUIRED FOR CARRYING OUT THE TEST IN THE FIELD.

In carrying out the test one is not always in a position to have a small laboratory close at hand for the sterilisation of syringes, needles, etc., and replacement or repair of breakages which may occur during the period of testing, and although this is convenient, it is not essential. The greater part of my experience in applying this test has been at a Field Veterinary Hospital, where I have endeavoured as far as possible to produce an appliance for field work which could be most easily carried about from place to place as required during testing. The first thing to be considered is an appliance for the sterilisation of the syringes and needles. A good spirit lamp should be obtained, in which the flame can be regulated by an adjustment screw. This is placed inside a clean, deep bucket so as to protect it from draughts, and a small pan, holding about one pint of water is placed on a stand attached to the upper part of the lamp. The lamp is lighted, and the water heated to boiling point, when the syringes and needles with spare parts are placed in the water for sterilisation, after which the flame of the lamp is regulated so as to keep the water just at boiling point in order that the syringes and needles may be sterilised during the period of testing. In addition to the above apparatus two syringes are required. I have found it always better to work with two syringes, so that while one is being used the other can be sterilised and filled with mallein. It is also advisable to carry a few spare parts of a syringe, or, even better, a spare syringe, and at least six new needles to allow for breakages, especially if a large number of animals are to be malleined.

It is important that syringes and needles of the best quality and those most suitably adapted for the test, should be used. Many

different kind of syringes have been submitted to me for test as to their suitability for the intradermal palpebral mallein test, but the only one which has given me complete satisfaction is the Straus-Collin pattern. It has proved reliable in adjustment, strong and durable, The piston-rod of this syringe is circular in section, spirally grooved, and graduated, and carries a small movable wheel by which the dose of mallein can be regulated. The syringe holds 1 c.c. of mallein (17 minims), and the dose of mallein dilue (1 in 4) being 2 minims, it is obvious that when the syringe is completely filled it contains sufficient to mallein eight horses.

The needles and syringes should be carefully examined for any defects before testing is commenced. The fine point of the needle requires the same protection as the edge of a razor; if it is broken off, or turned up in the slightest degree, the needle is rendered useless, and should be immediately replaced.

The free portion of the needle of the Collin syringe is $\frac{5}{8}$ inch long, and this may be considered as the most convenient length. I have tried needles 1 inch and $1\frac{1}{2}$ inches in length, and find them very clumsy to work with and difficult to manipulate between the layers of the palpebral membrane, consequently by using them one is more likely to introduce a dose of mallein hypodermically.

METHOD OF APPLYING THE INTRADERMAL PALPEBRAL MALLEIN TEST.

The left eye is the one usually selected for applying the test. The selection of the area on the palpebral membrane for carrying out the test is of great importance. The most convenient place is midway between the outer and inner canthus of the eye, and not more than $\frac{1}{2}$ inch below the edge of the lower eyelid. This area is devoid of hairs and can be most easily made tense, a condition which facilitates the entrance of the needle, and also enables one to regulate the depth of the needle when inserted horizontally, so as to keep it between the layers of the palpebral membrane when the dose of mallein is being injected. It will thus be observed that great care is necessary in carrying out the test in order to ensure that each dose of mallein is injected intradermally. It is important that the animal should hold its head perfectly still while the injection is being made, and although some animals of a quiet disposition can be malleined without being secured, or even by grasping the right ear with the hand, I have found it the quickest and most convenient method to apply a twitch to the right ear in each case, especially when a large number of strange animals have to be malleined. When the above precautions are taken in securing the animals it is possible in every case to inject the dose of

mallein intradermally. There are, however, exceptions, when one occasionally meets with a horse or mule which is so restless and difficult to secure that one feels doubtful when the injection is made whether the dose of mallein has been introduced intradermally or hypodermically. The proportion of these animals is, however, comparatively small, and although a reaction will be given, the reaction is more marked with intradermal than hypodermic injections. I make the latter statement from actual experimental observation.

CHANGES TO BE OBSERVED IN THE EYE OF A NON-REACTER.

Within the first six hours after the injection has been made there are certain changes which take place in the eye of a non-reacter which have been found in some instances to cause grave alarm to those who are not thoroughly acquainted with the peculiarities of the test. Within an hour of testing, a slight, longitudinal oval swelling will be observed at the seat of the injection; this initial swelling in some animals only attains the size of a pea or broad bean, whilst in others it assumes enormous proportions, extending literally to the outer and inner canthus and downwards as far as the zygomatic ridge, and in some instances closes up the eye. The swelling increases in size, and attains its maximum about the eighth hour, after which in a non-reacter it rapidly diminishes in size, and will have almost completely disappeared by the eighteenth hour, and should have totally disappeared at the end of twenty-four hours. During this period a slight watery or viscid discharge will be observed from the eye, and in some cases I have noticed a slight catarrhal discharge issuing from the inner canthus. The swelling is usually sensitive to the touch, but not so painful as in the case of a reactor.

CHANGES TO BE OBSERVED IN THE EYE OF A REACTER.

In the early stages the changes are similar to those of a non-reacter, but in the case of a glandered horse the initial swelling always persists for an indefinite period beyond the eighteenth hour, and generally from two to four days, though I have a case on record in which the eye swelling had not completely disappeared at the end of five days. The swelling is extremely painful to the touch, but its outline is not so well defined as the initial swelling of a non-reacter. There is almost invariably a thick viscid catarrhal discharge from the eye, chiefly from the inner canthus, which adheres to the sides of the face and fringes of the eyelids, often causing their complete closure.

The swelling usually takes the form of a triangular projection downwards and forwards towards the lower extremity of the zygomatic ridge, and in some cases the whole of the side of the face becomes swollen.

TEMPERATURE REACTION.

In carrying out the intradermal palpebral mallein test, it is not usual to take temperatures, though it is interesting and important to note that should it be desired to take temperatures, this must be commenced at an earlier hour than is usual with the ordinary hypodermic test in the neck. As a rule the highest temperature is to be found at, or about, the ninth hour, after which the temperature gradually subsides.

CONFIRMATORY TEST.

When a reaction is given to the intradermal palpebral mallein test, it is sometimes advisable, though not essential, to follow it up with a second test within forty-eight hours. This may be carried out on the opposite eye, or a hypodermic injection of 1 c.c. of the ordinary mallein may be given in the neck, when, if a definite combined reaction is obtained in both eyes, or in one eye and the neck, it may be taken as sufficient evidence alone (apart from temperature reaction) to confirm the diagnosis of glanders.

The following is a record taken of two cases which gave a definite combined reaction in the left eye and the left side of the neck :—

Case 1.—Subject, bay gelding (mule) 7 years old, animal in good condition. Inoculated (eye-test) January 2nd, 3 p.m.

January 3rd, 10 a.m. Lower eyelid swollen and extremely painful, the swelling extending downwards as far as the zygomatic ridge. The eye was partly closed, and a slight catarrhal discharge was observed to accumulate at the inner canthus. The mule was tested in the neck with 1 c.c. of ordinary mallein.

January 4th. Lower eyelid still swollen and painful, and the discharge increased and adhering to the side of the face. There was a swelling in the neck 5 ins. long, somewhat doughy in nature, but not very painful.

January 5th. Eye swelling persistent, still painful. The neck swelling slightly increased, and more painful than on the previous day. The mule was destroyed on January 5th, and *post mortem* examination revealed glanders nodules in both lungs. The trachea, larynx, and septum nasi were apparently free from lesions.

Case 2.—Subject, brown mare (H.D.) 10 years old. Animal in fair condition. Clinical symptoms. The submaxillary glands were enlarged and the left gland partially adhered to the side of the jaw. There was a thick, catarrhal discharge from both nostrils, and numerous large and small ulcers were found on the inside of the off hind leg, extending over an area from above the hock downwards to the side of the fetlock joint. Inoculated (eye-test) January 16th, 3 p.m.

January 17th, 10 a.m. Lower eyelid considerably swollen, extending from the outer and inner canthus as a triangular projection downwards and forwards to the zygomatic ridge. The eye was partially closed and extremely painful to the touch, and a slight catarrhal discharge was observed, which adhered to the free edges of the eyelids. Tested in the neck with 1 c.c. of ordinary mallein.

January 18th. Eye-swelling increased in size and extending downwards to the lower extremity of the zygomatic ridge, the eye was completely closed. The catarrhal discharge was increased, and of a pale yellow colour, somewhat viscid in character and adhering to the side of the face. There was a swelling in the neck about 4 ins. long, slightly painful on palpation.

January 19th. Eye-swelling much reduced in size, but still very painful. Swelling on the neck increased in dimensions and somewhat doughy in nature; greater pain is evinced on palpation than on the previous day.

This horse was destroyed, and *post mortem* examination revealed numerous large and small glanders nodules in various stages of development in both lungs. There were no lesions in the trachea, larynx, and lower two-thirds of the septum nasi, but on the upper third of the septum and on both sides of it were found several shallow erosions and a few definite glanders ulcers.

Although in the majority of cases where horses and mules have been tested and found to be affected with glanders a definite reaction has been obtained in both the eye and the neck as a combined test, there are a few exceptions. I have two horses on record in which a definite reaction was obtained with the intradermal palpebral mallein test, and no reaction whatever was given to a subsequent hypodermic injection of 1 c.c. of the ordinary mallein in the neck. These animals were destroyed as a result of the eye-test reaction, and found on *post mortem* examination to be affected with glanders. The particulars of the test, with nature of the reaction, and *post-mortem* appearances, in one of these animals is given herewith in detail:—

Subject, bay mare (rider) 12 years old. The animal was in rather poor condition.

Clinical symptoms: The submaxillary glands were enlarged and pain was evinced on palpation; no lesions were observed on the lower part of the septum nasi, and there was no discharge from the nostrils.

The horse was inoculated (eye-test) February 2nd, 3 p.m.

February 3rd, 10 a.m. The lower eyelid was swollen, tense and painful; there was a slight, catarrhal discharge of a pale yellow colour from the inner canthus, and the eye was almost closed. Tested in the neck with 1 c.c. of the ordinary mallein.

February 4th.—The eye-swelling was slightly reduced in size, but still very sensitive; a slight viscid catarrhal discharge was observed along the edges of the eyelids. There was no swelling in the neck.

February 5th.—The eye-swelling persists, but is considerably reduced in size, and not so painful as on the previous day. There was still no swelling on the neck.

The eye-swelling had not completely disappeared on February 6th, when the animal was destroyed. This horse was destroyed as a result of the eye reaction alone. *Post mortem* examination revealed numerous glanders nodules, varying in size and at different stages of development, evenly distributed in both lungs. There were no lesions in the trachea and larynx, but a few glanders ulcers were found on the upper third of the septum nasi.

From the results of the above test, which are taken from actual observation, it is conceivable that the intradermal palpebral mallein test is a more delicate one than the usual hypodermic injection of 1 c.c. of ordinary mallein in the neck, since in the latter test no reaction was given, whilst in the former test a definite reaction was obtained.

FRACTURE OF THE TIBIA.

By RICHARD JONES, M.R.C.VS.

(*Towyn.*)

The patient in this case was a 3-year-old draught filly.

On Thursday, December 28th, 1916, a strange horse was put in a stall on the off side of the filly overnight, and a small wound was noticed on the morrow.

She was left in the stable until Wednesday, January 3rd, and the owner thought she was well enough to work. She was taken out to plough, and did plough for a whole day.

On Thursday, January 4th, she was put to work the outside gearing to chaff, and before she had gone many rounds, displacement of the fractured bone took place. She was taken to the stable with difficulty. I was called to see her on January 5th. I found her down in a stall on the near side, unable to rise. I had her turned over to the off so that I could have a better view of the fractured leg—the near hind.

I explained to the owner that nothing could be done, and that she had better be shot. To this he consented, so I shot her before leaving the premises.

Moral.—To sling such cases until there is proof that fracture without displacement has not taken place.

AN INTERESTING CASE OF SPURIOUS HERMAPHRODITISM.

By C. HAYWOOD, M.R.C.V.S.

Leicester.

WHILE examining a number of Army Remounts, I noticed that one, to all outward appearance a bay mare 16 hands, possessed an abnormally long vulva. On attempting to insert my hand into what I supposed was the vagina, I was unable to proceed more than a few inches as a blind sac was encountered. On everting the labiæ, I found on the floor of the "vagina" a small well-formed penis, a little more than 2 inches in length, with a Patent urethra and a fully-formed navicular fossa (see Fig. 1), surrounding which was an abundance of smegma.

Upon observation it was discovered that the animal micturated through this urethra; furthermore, when placed in close proximity to mares, the animal showed signs of sexual excitement, an erection of the penis with ejection of fluid taking place.

External examination revealed no sign of testicles. The teats and mammary glands are well developed—indeed, larger than those of an average maiden mare, and the teeth present the typical appearance of a gelding, showing particularly well developed tusches (see Fig. 2). The animal is very docile and a willing worker.

The accompanying illustrations have been made from photographs lent to me by the Officer Commanding the Depot.

[Although commonly termed cases of "Hermaphroditism," these are really "arrested development."—EDITOR.]

A CASE OF EQUINE SCABIES IN THE MOUSE.

By THOMAS PARKER, F.R.C.V.S.

Veterinary Officer to the City and County of Newcastle-upon-Tyne.

Whilst examining the last two horses concerning the outbreak just described* under (c) I observed a mouse running along the stable floor, making towards the door. Scabs could be plainly seen on its back and ears. With the assistance of the horsekeeper the little individual was secured and killed. The tail had been removed from within about $\frac{1}{4}$ inch of the sacral region, and the off hind limb was absent from the stifle downwards. The missing parts must have been severed for some considerable time, for the stump, in each case, was perfectly healed and exhibited no sign of any irritation. On each side of the back there was a lesion about $\frac{1}{2}$ inch long, about $\frac{1}{4}$ inch broad, and almost oval in shape. The crusts, somewhat yellowish white in colour, and about $\frac{1}{4}$ inch thick, were slightly elevated, exposing blood-stained areas. the edges, particularly the lower and outer

* *Vide* previous clinical "Three Cases of Equine Sarcoptic Scabies in Man."

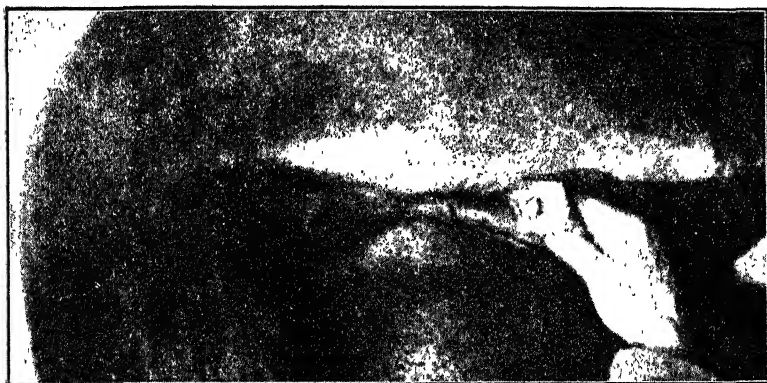


FIG. I.—Shewing Rudimentary Penis.

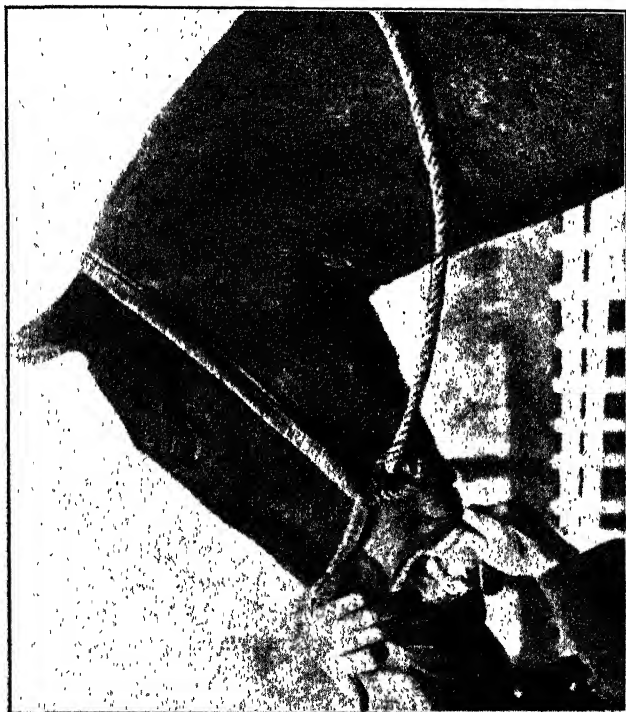
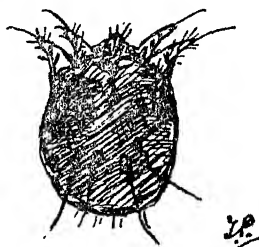


FIG. II.—Shewing Tushes.

parts, of each ear presented scabs also. On arrival at my office the crusts and deep scrapings were taken from the lesions of the back, and immersed in a 10 per cent. solution of caustic potash. The next morning a few slides were prepared and examined under a low power of the microscope. On two of these eggs were found exactly similar to those found in the specimens obtained from two of the horses. On another slide several parasites were found. One of these, after being separated from the surrounding debris and more carefully examined, was found to be an adult acarus having all the characteristics of the equine sarcopt. This outbreak appears to be unique in one particular, namely: That there is very strong evidence on the one hand that the disease was transmitted to man, whilst on the other there is positive evidence that it was transmitted to a mammal other than man, *e.g.*, a mouse. Apart from this most interesting feature, others of



Sarcopt. (equine) from the Mouse.

much more importance are illustrated, and therefore provide reasons for careful thought by those called upon to deal with outbreaks *e.g.* :—

- (1) Does the probability of mice and, perhaps, rats or even cats being affected while living within infected stables, either temporarily or permanently, offer any explanation why in some cases recurrent attacks of the disease (as recorded by some observers) occur, notwithstanding most vigorous treatment of the animals and disinfection of the premises?
- (2) Is it not possible for these mammals (mice, etc.) to become hosts—even although only temporarily—for a period sufficiently long to enable them, after having migrated to neighbouring stables, to successfully convey the disease to other horses?

Neumann's statement that there is no authority for stating that horse mange may be communicated to the sheep, goat, dog, etc., having regard to previous observations, might be considered rather interesting on the following grounds :—

- (1) Dogs, and particularly sheep and goats, do not—in this country—commonly live in stables with horses.
- (2) Mice are common to most stables.

STRUCK BY LIGHTNING.

By P. G. BOND, M.R.C.V.S.,
Plymouth.

THIS is not an unfrequent incident in a country practice.

Some time in last autumn a farmer client called upon me and stated as follows: "I had a heifer killed by lightning yesterday afternoon, and I want you to give me a certificate to that effect, as then I can claim from the Insurance Company. I have seen the agent, and he says I must get a veterinary surgeon's certificate as to the cause of death, and then the office will no doubt pay me."

This appeared to be a very convenient arrangement to the owner of the animal. My reply was: I must first see the carcase and, if necessary, make a microscopical examination of the blood, and make notes of the facts connected with the case. One thing I had to make sure of, had there been lightning recently in the district?

I visited the farm about noon next day; I could not attend before. The animal had been dead about forty-eight hours when I saw it. I found it in a field, lying on its side with the fore legs turned back under, the head protruding, rigid; no discharge of blood from the nose or rectum. The udder—it was a first time heifer in calf—small and pale pink in colour. In anthrax this is usually of a bluish-red colour, rather angry looking; a little froth from the mouth; body a little tympanitic, not prominent.

It was lying close to a ditch, and there were signs of the soil having been disturbed just round the spot where the carcase lay. In the same field there were ten others, and near by was a large beech tree shadowing that part of the field.

The weather was very hot with bright sunshine, and had been so for several days. On the afternoon and night prior to the animal being found dead there had been a very violent display of lightning—sheet lightning, very vivid and constantly repeated throughout the night. The suggested cause of death seemed feasible.

There were conditions that indicated possibly anthrax, malignant oedema, yew poisoning, or enteritis. I could not detect any anthrax bacilli in the blood from the ear, and when I made a *post-mortem* examination afterwards the spleen was normal, the rumen free from any yew or what could be called poisonous vegetable matter. The carcase on the whole presented the conditions similar to those exhibited in inflammatory oedema or a typical quarter ill.

When animals are killed by lightning, the death is so instantaneous that frequently the posture of the dead animal is the most remarkable feature. What is the diagnostic feature of death by lightning? The first case I met with in 1869, was that of twenty sheep killed.

They were all right before the storm; they were found dead after the storm. They were in different postures—some on their sides, some on their backs, some kneeling, some kneeling on one leg, others apparently feeding; no marks of fire on any of them; no trees very near. The Insurance Office, whilst not admitting liability, paid as an indemnity the sum of £3 a sheep to the owner. From this date other offices did likewise, and now it is a regular item included in a farm policy against loss of animal life as a result of fire.

Other cases where the animal has been grazing underneath a tree the lightning has run down the tree and struck the animal dead. In one case a horse was out in a thunderstorm in a carriage, one of a pair. The lightning so played round the steel bit that the horse became very excited, it could be held with great difficulty. It reached the stable yard, but, on being taken out of harness and put into its box, dropped dead.

In another case, that of a cow, it was found dead, with one foreleg stretched out, one foreleg bent back under; one hind leg straight back, one underneath the abdomen. The leg stretched out had a branch of a tree on it, broken, in my opinion, by the same force that killed the cow.

In another case the death was actually witnessed, and here the cow was under an elm tree. The tree was struck, and the effect shown from top to bottom. The cow was struck on the poll; the fire had apparently run down the neck as far as the withers, then turned to the left and run down the left fore limb into the ground. Of these cases there was no doubt as to the cause of death, it was evident enough; it is in the other cases where such prominent features are absent, where the difficulty of an accurate diagnosis comes in.

In another claim made on a company, I was asked to investigate and report. I felt doubtful, and to help me to decide, I applied to the Meteorological Office and found that no lightning of any kind, sheet or forked, had been recorded during the whole of the month in which the animal was said to have been struck. I did not give a certificate that the death of the animal was due to lightning stroke, and the claim fell through.

In appearance *post mortem* the animals do not, in my opinion, decompose very rapidly. The death is so instantaneous there is scarcely time for the decomposition to set in. The *ante mortem* changes in the tissues have not taken place. The eye presents an open kind of look, not that dull appearance usually shown in death.

In the first case mentioned, after obtaining all the evidence from the autopsy, and the history of the case, I gave a certificate that the animal was struck by lightning, which caused its death. There was

no other death at the farm, nor did any of the other ten show illness. I acted for both the owner and the insurance company. The company thanked me for my report and paid the claim without demur.

These cases come before us at times, and their explanation is not quite so easy as it appears.

CASTRATING ROPE.

RICHARD JONES, M.R.C.V.S. *Towyn.*

It occurred to me when operating on a 2½-year old "rig" in my yard that I would have my casting rope photographed. It is by far the best and most expeditious rope I have used or seen. A rope of this kind was given to me by a castrator in mid-Cardiganshire for allowing him to see a "rig" being chloroformed and operated upon. All veterinary surgeons and castrators who have seen it being used have been highly satisfied with it, and I have procured similar ropes for quite a large number.



FIG. 1.—ROPE ADJUSTED READY FOR CASTING.

The photograph No. I shows the rope placed on the colt, ready for casting, and No. II shows the same thrown, tied, with sacks of straw packed on each side to keep the patient on his back during the operation. It will be seen in photograph No. II that the hind legs are not drawn too far forward, thus leaving inguinal region better exposed and more "get-at-able."

The tying with this rope is exceedingly expeditious. When

the colt goes down, the loose rope on each side is taken back inside the forelegs, passed round the hind pastern from outside in, and a loop with a half twist passed from outside underneath the hind leg and the forefoot inserted in it ; the rope is then pulled tight. This is all the tying necessary to make the patient, whatever size he may be, absolutely secure.

It will be seen from the photograph that the pull is from the withers and the side of the neck, and in several instances I have known the rope to slip from the pastern up to the thigh when the hands in casting have been too weak to get the horse down at the first pull. To remedy this defect, I had rope hobbles made as follows, to be fixed to the hind pastern. I have a piece of roping long enough to



FIG. 2.—COLT TIED AND FIXED IN POSITION FOR CASTRATION.

go round the pastern, with a loop spliced on one end, and a brass eyelet spliced on to the other. The eyelet end is passed through the loop and the side ropes drawn through the eyelet to another eyelet on the side of the neck.

The other photographs may be of interest to your readers. They show a young cow suffering from traumatic pericarditis. I intended to operate, but she died more suddenly than I expected.

I am indebted to Miss Andrews and my daughter for the photographs.



FIGS. 3 AND 4.—COW SUFFERING FROM TRAUMATIC PERICARDITIS.
Case recorded by Mr. Richard Jones, M.R.C.V.S., Towyn.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.*

By A. S. LEESF, M.R.C.V.S.

(Continued)

DISEASES OF RESPIRATORY SYSTEM.

Torn nostrils are almost confined to camels in which nose-pegs have been inserted; the condition occurs from repeated strain on the nose-rope, which is attached to the peg by string. It is therefore found to occur chiefly in sick or lame camels which have been made to work with others; in overloaded camels; and in badly driven strings of camels in hilly country. A septic condition of the nose-peg hole, which sometimes gets "fly-blown," predisposes to "torn nostril" and even a fatal phlebitis; this is common in Scinde, where blow-flies are active for a great part of the year, as there is no real cold weather. A campaign against the use of the nose-peg in riding-camels in Scinde might save a good many lives and certainly great suffering. It is doubtful whether the entire pack-camel of India could be managed without the nose ~~peg~~.

There is nothing special to note concerning treatment; but septic wounds about the nostrils should be thoroughly freed from necrosis and maggots and carefully dressed; the fatal phlebitis above referred to will be described under "Surgical Conditions of Head," and ends in meningitis.

Catarrh and *Bots* have already been referred to.

Fractures and *Ostitis of turbinated bones* cause nasal wheezing from narrowing of the meatus, and are sometimes curable by bold operation. Pus generally works out on to the face and guides one as to the seat of injury. The cause is a blow over the nose.

Laryngitis is a rare disease in camels: the veterinary surgeon should know that the common febrile diseases causing swelling in the region of the throat are pharyngitis from irritant plant-poisons, traumatic inflammation of the palatal expansion, and anthrax.

BRONCHITIS, BRONCHO-PNEUMONIA, CROUPOUS PNEUMONIA, LUNG- ABSCESS, AND PLEURISY.

The course and treatment of all these diseases in camels resemble those of other large animals. Exposure to cold and wet predisposes to broncho-pneumonia, as also does debility from any cause; indeed, broncho-pneumonia finishes off many camels weakened by trypanosomiasis. Croupous pneumonia is met with as an apparently contagious disease in 4, 5, and 6 year olds. Pleurisy may accompany pneumonia; or it may be specific, caused by a bacterium of the fowl cholera type,

* For previous instalments, see page 79 (March), page 136 (April), and page 167 (May).

in weakened subjects. The specific lung diseases already described, such as verminous bronchitis, tuberculosis and pyæmia, must not be forgotten in diagnosis. Pneumonia sometimes arises from choking by medicinal draughts carelessly given, particularly oily ones.

The common sequels of pneumonia in camels are (i) lung-abscess and (ii) œdema of lungs. Lung-abscess is by far the most common cause of *chronic cough* in camels; the cough is most often noticed early in the morning, and also after rising from the sitting position. Camels with lung-abscess often have indifferent appetites and temperatures above normal; they gradually waste away, although death may not take place for months. It is a matter worthy of note that all known causes of chronic cough in camels are incurable (lung-abscess, chronic “dry” pleurisy, and tuberculosis); an emaciated camel that has had a chronic cough for two months can safely be destroyed. Grinding of the teeth, and grunting on rising, are sometimes indulged in by camels with lung-abscess; nasal discharge is generally absent. Many camels recover from pneumonia and pleuro-pneumonia. Œdema of the lungs is chiefly met with in camels which are the subjects of the acute form of trypanosomiasis. A chronic “dry” pleurisy with extensive adhesions, causing emaciation, occasional cough and irregular temperature, may supervene on an acute pleurisy.

Fractured ribs are common in camel-practice and may produce localised pleurisy; or may penetrate the lung. As regards the symptoms of the acute diseases of the chest, the camel shows the classical abnormalities in the respiratory movements extremely well; in health, the “thoracic” respiration is less marked than in the horse, the ribs of the camel being weight-bearing bones and less capable of movement; the “abdominal” respiration is more pronounced than in the horse. A soft sigh-like, cough; sitting inclined towards one side; absence of nasal discharge; are rather characteristic of pneumonia in camels. The painful stages of pleurisy are marked by frequent changes of attitude and grunting. Œdema about the lower part of the chest and belly occurs when the heart is hard-pressed.

Treatment of the acute diseases of the chest follows the usual lines, the special points applying to camels being:—

- (i) Examine the blood for co-incident trypanosomiasis.
- (ii) Examine the ribs for fractures.
- (iii) Never tie the sick camel down in the sitting position, as he prefers to stand most of the time and to change his position frequently.
- (iv) Ammonium Carbonate, $\frac{3}{4}$ to $\frac{5}{8}$ in bolus, is a particularly effective drug in camels with pneumonia, probably, as I have said before, because of the great length of their trachea. Strychnine (up to $1\frac{1}{2}$ grains hypodermically) is also very useful.

(v) Carefully attend to all the items mentioned in the section "Nursing of Sick Camels."

Hydatid cysts are present in the lungs of many camels, and a large number can be harboured without any inconvenience whatever. I have met with one case, however, slowly suffocated by having its lungs crammed with cysts; the symptoms were emaciation and dyspnoea, unaccompanied by loss of appetite, abnormal temperature or cough; and I have never met with this clinical "picture" in any other camel-disease.

Nodular disease of lungs is met with in *post-mortems*, and resembles the same condition in horses. It has no clinical importance.

DISEASES OF CIRCULATORY SYSTEM.

An irregularly intermittent pulse is sometimes met with in healthy camels. The only diseases which need be mentioned here are pericarditis, atrophy of heart, and anæmia (parasites of the blood have been dealt with). I believe that the sudden death so often noted in trypanosomiasis is due to thrombosis with embolism. A case of *Traumatic pericarditis* has recently been reported in the *Veterinary Record*; it is very rare in camels, in spite of their prickly diet, and I have never seen a case.

Pericarditis, due evidently to a bacterium of the *Hæmorrhagic Septicæmia* type and accompanied by pleurisy, has been seen in a camel weakened by trypanosomiasis. The symptoms were the classical ones, and the pulse-beats were increased in number out of all proportion to the increase in respirations.


Atrophy of the heart. This, associated with extreme *anæmia*, is the common condition which makes it impossible to bring extremely emaciated camels back to health. The heart-wall is sometimes only $\frac{1}{4}$ inch thick, even in the left ventricle. The blood looks like claret and the muscles are all oedematous. Anæmia in a less severe form can often be cured, and the magic word "debility" should, in the case of camels, generally be dropped in favour of "anæmia." Treatment with iron compounds is beneficial in practice.

DISEASES OF DIGESTIVE SYSTEM.

Abnormalities of teeth. Among conditions affecting incisors and tushes, one may see "overshot," "undershot," and irregular direction of growth of incisors; the two former are only serious if very marked and in grass-grazing breeds; the latter is corrected by shearing those teeth which inconvenience the animal. Badly healed fractured lower jaw may necessitate the rounding-off of tushes to prevent injury to the palate, especially when the jaw heals with a "twist" to one side. Molar teeth are practically never affected with caries; alveolar periostitis is very rare too, and the superior maxillary sinus, which is

extremely small is not, in my experience, liable to suffer from disease. Overgrown grinders are treated as in the horse, but are much less common. The disease of molars in camels most often met with is an abnormal space between the first molar of the upper jaw and the premolar in front of it; in this space, twigs become lodged, and, by sticking out on either side, cause ulceration of palate, tongue or cheek, as the case may be. I have seen cases fired externally by camelmen under the impression that the swelling of the cheek was a "boil." Treatment consists in daily removal of twigs and food from the space. I have succeeded in preventing this accumulation of food for six months by packing the space with gutta-percha, but the gutta-percha must be at exactly the right consistency when applied, and the camel's mouth kept shut with a rope for at least half an hour after, so as to prevent him chewing the cud until the "stopping" has hardened.

INFLAMMATION OF PALATAL EXPANSION.

This is a condition peculiar to camels, and is generally traumatic, the palatal expansion of camels being exposed to bites of other camels when it is extruded from the mouth during fights between rutting males. There is complete inability to swallow food, with a large painful swelling in the region of the pharynx; sometimes there is a hard paroxysmal cough, and generally there are frequent swallowing movements. The head is extended on the neck (*i.e.*, nose is "poked out"). The condition must not be mistaken for anthrax or for irritant plant-poisoning; in anthrax, the swelling is largely subcutaneous and in injury to the palatal expansion it is palpably deep; in plant-poisoning, there is generally some vomiting. One generally has a history of "rutting" to help in diagnosis; and an examination of the back of the mouth will enable it to be made; if the organ cannot be seen, it may often smell putrid, and a manual examination of the palatal expansion, made by means of a mouth-gag, reveals a large, hard, painful swelling in it. The best gag for this purpose is one made by wiring together four strong wooden bars thus 

The palatal expansion, when wounded, shows a great tendency to chronic inflammation and indolent ulceration. Treatment consists in surgical removal of the greater part of the organ, including the diseased portion. This is done by extracting the organ as far as possible by hand and cutting it across at about the level of the first grinders. There is practically no hæmorrhage and little pain is involved in this amputation, and the camel is relieved instantaneously, requiring no further doctoring. It is possible that this operation may reduce the thirst-enduring power of the camel, but the disease will eventually prove fatal if this operation is not performed.

Pharyngitis is chiefly seen in irritant plant poisoning, and is usually accompanied by vomiting. It must not be mistaken for anthrax.

Choking is frequent in greedy camels which bolt their grain ration. I have never seen a case which did not soon recover by either leaving it alone or administering, carefully, small draughts of water.

Parotiditis. I have met with one or two cases due to plugging of Stenson's duct at the buccal opening, which is easily located on a very large papilla inside the cheek. Treatment is as in other animals.

Vomiting. True vomition is seen in camels which are suffering either from impaction of third and fourth stomachs or from plant poisoning (oleander, datura, irgin, and many others), but it remains to find a drug which can produce it. In sick camels liable to vomit, the tissues of the under surface of the neck have a peculiar sagging appearance.

Tympanitis occurs in camels under similar circumstances as in cattle, and is treated in the same way. I have seldom found it necessary to use the trocar, because the camel can generally be cured by drugs, viz., linseed oil 1 quart, turpentine 1½ or 2 ozs., and annon. carb. ½ to 1 oz. If poisoning is suspected, the amount of linseed oil should be 2 quarts. Tympanitis in camels sometimes supervenes on diaphragmatic pleurisy. If trocar and canula are used, they should be fine ones, not the clumsy cattle pattern. If left untreated, tympanitis finishes up in true apoplexy, and, once a camel has got thus far, I have not found that removal of the gas from the paunch will cure him. Impaction of the first stomach with food does not appear to be a disease of camels.

(To be continued.)

Translations.

MANGE AND THE AIR CURE.—ABSTRACT.

By M. BERTON,

Veterinary Surgeon, Chief of an Army Veterinary Service.

Putting aside for the moment all prophylaxis, the treatment of mange comprises a therapeutic and hygienic part.

A.—Clipping ought to be done in all cases, whatever be the intensity of the disease, or whether it consists only of a few cutaneous islets or extends to large surfaces. The mane is clipped; at the end of the tail a wisp of hair is left as a defence against very aggressive flies in summer and autumn. By this preliminary operation the skin surface is rid of gross impurities, and in a condition to receive with advantage soapy lavages and parasiticide applications. Clipping arouses cutaneous radiation, exaggerates respiratory combustions, and increases chemical action. It reawakens languid functions, and perhaps thus adds to the benefit of therapeutic action. But, whilst stimulating

organic action, it may bring about a decline of condition, an accentuation of leanness, if it is not compensated for by good feeding, the keeping of the patient for some days in the stable, with shelter from sudden thermic changes. After clipping, one must proceed to clean and scrape the skin in a way that is not indifferent to the early production of results. A hot solution of soft soap is first prepared, then applied progressively from the head to the tail, region by region, on all the tegumentary surface, with the aid of a spray or other appropriate apparatus. Beneath the fine spray the brush parts the hair and makes the soapy solution penetrate, whilst a helper, armed with a spatula—a fragment of hoop iron will do as well—scrapes the skin immediately after the brushing. To this first operation succeeds a fresh rinsing with pure warm water (not soapy), and renewed without interruption until the spatula only carries away liquid exempt from all impurities. Thus prepared, the skin is quite ready to profit largely from antipsoroptic applications, without it being submitted to the brutality that too often accompanies the current method of all good therapeutic scrubbing.

It has been stated that pomades, oils, and embrocations should be discarded, and the functions of the skin encouraged, and the spontaneous reaction of this initial defence counted on. One only seeks after a relative offensive in using antipsoroptics without waiting for the immediate and complete destruction of all acarian colonies. To attain this, limited and warm solution suffices—Polysulphate of potash in the proportion of 2 to 2½ per cent. gives excellent results.

A little tin box, holding one or two litres, pierced with a small hole on the lower part of the wall, is sufficient to water the entire surface of the integument. One assistant moves the tin about, whilst another spreads and rubs the warm antipsoroptic solution into the skin with the naked hand. This operation, made with great care as well on the regions obviously ill as on those apparently healthy, takes up fifteen to twenty minutes. It is renewed three or four times at intervals of twenty-four hours, and during all this period of treatment the patient ought to be kept in the stable, receive the diet ordered (corn if possible, bran and linseed meshes, hay of good quality), and be watered at least three times a day.

B.—This first period of treatment ended, the horses are let loose, and put at liberty in the meadow day and night whatever be the season and inclemencies. The air cure finishes the recovery commenced, and, moreover, does it more surely than it can do without this preliminary help. It is hardly any use establishing categories of patients; the extent of the pasture, the length of time of treatment, is the only guide for the constitution of the lots. In the hygienic supervision afterwards there is no need to bother about the persistence (unless

exceptional) of a certain itchy state always without a morrow, the reaction to "scratching," which in the great majority of cases is without value, although its expression seems to-day for many practitioners to have a precise meaning, and to constitute an infallible diagnostic sign. (At the depot of S., a horse under treatment for mange for many months commenced to grimace at the appearance in its neighbourhood of the smock of the veterinary surgeon.) It is of the greatest importance that the pastures be traversed by a course of water that assures a permanent supply. For the special aim proposed—recovery from scabies—the quality of the pastures with regard to herbage has only a very relative value, it being necessary that the horses should receive their total ration of forage and corn; also, movable mangers must be provided to carry this out. A meadow of good quality, that can nourish two horses per hectare (about $2\frac{1}{4}$ acres) to the exclusion of all complement of hay and oats is capable by this plan of easily accommodating at least fifteen horses.

The site is still quite large enough to allow the patients sufficient exercise, indispensable to the good carrying out of all functions—above all, to the activity of heat generation related so closely to muscular work. This method of treatment, whilst suitable to large bodies of horses, is perfectly convenient for special depôts which at certain periods serve as hospitals for a great number of sick animals. Simple, expedient, not requiring many attendants, it avoids overcrowding, and accommodates itself best of all to the actual necessities of war by producing the best results at the least cost. Doubtless it is nothing new; the medication noted is of old practice. Its originality consists in acting equally on the acarus and on the soil that harbours it. It has good physiological common-sense at the back of it, and through it the acarus finally is brought to account by its host.—*Revue Générale de Méd. Vet.*

G. M.

[M. Berton first had his attention called to the value of the air treatment by the fact that twelve horses with all the clinical appearances of mange came up cured after two months at pasture without any medical treatment. Later on, ten out of twelve horses (three types of mange diagnosed by finding the mites) recovered in two months by the outdoor treatment, supplemented by good feeding and drink at will.]

THE USE OF SUGAR IN SURGICAL LESIONS OF THE FOOT OF HORSES.

By P. BIMBI.

The author supports the conclusions of Brussano on the absorbent, antiseptic, cicatrising, and antiputrescent qualities of finely powdered sugar. His observations show that sugar contributes to the rapid

cleansing of the wounds to which it is applied, it hinders the formation of pus, and assures prompt cicatrisation. Sugar acts quite particularly and very favourably on the regeneration of horny tissue. No substance among those which are regularly employed in the treatment of surgical affections of the foot (Socin's powder and paste, naphthalene, carbolised oil) is possessed of the same properties as sugar. Sugar acts markedly in favouring the repair of horn substance, whilst other substances act chiefly on soft tissues. By its use superabundant granulation is avoided and cure more rapidly obtained.—*Il moderno Zooiatro*.

DRAINAGE BY MEANS OF HORSE HAIR.

THE importance of good drainage to wounds is understood by all practising veterinary surgeons. P. Morel and V. le Page, writing in "Recueil de Méd. vétér. Bulletins," for 1916, discuss drainage by the use of horse-hair. The procedure is to pull out a few hairs from the horse's tail, and draw them through wounds, natural cavities, abscesses, etc., with a view to securing the carrying away of exudate. The hairs to be used are prepared by placing them in a strong, disinfecting solution of potassium permanganate, or creolin. Locks of four to ten hairs are drawn through the region with an iron needle, which any shoeing smith can make on the field, in such a way that the ends of the strands hang out at the entrance and exit of the opening. Several times each day the drainers are drawn to and fro. Two knee-joints, a wound on the withers, an abscess under the chest, a gall of the stifle, a cold abscess of the shoulder, a commencing quittor were drained in this way. In all the cases cure resulted in one to four weeks. The procedure is very simple, and is accompanied by little pain. The resulting scars are tractable, painless, and the animals are soon fit for work again.—*Swiss Veterinary Journal*. G.M.

Abstract.

THE PHYSICAL EXAMINATION OF DAIRY COWS.*

By J. L. WILDER,
Akron, N. Y.

I HAVE not selected this subject with any thought of advancing some new or better method of examining cows for dairy production. My object is to try to arouse a discussion here that may lead to a better understanding as to what is a good, practical physical examination. I mean an examination that will eliminate those

* Read at the meeting of the Western New York Veterinary Medical Association, Buffalo, N. Y., December, 1916.

cows that are a menace to public health. I mean an examination that is a credit to the veterinary profession instead of being a joke. An examination that will cause the dairyman to feel a sense of satisfaction regarding the health of his herd, instead of having a feeling of being imposed upon by the health department and the veterinary profession.

When called by the dairyman to examine his cows—and I believe no veterinarian who is true to his profession will go to a stable until called—I do not believe in making false motions simply to cause an impression, but go about the examination in a practical, professional manner.

There can be no rule as to what to do first or what last, but I think each man should decide on a system of his own, and then adhere to that as nearly as possible.

I am going to describe as nearly as I can my own mode of procedure, not because I think it is better than any other, but it is the easiest way I can explain what I consider a fair and practical physical examination.

First, I auscultate the lungs carefully and percuss wherever auscultation reveals any sound not entirely satisfactory. Second, I manipulate the lymphatic glands in the pectoral region and those of the flank, and I regard with suspicion those that are hard and knotty or sensitive. Third, I examine the udder, drawing a little milk from each teat into the hand. Fourth, I examine the head for actinomycosis, and manipulate the submaxillary and parotid glands. Following this I look for vaginal discharges or any suppurating wounds on the body.

Possibly this examination, that I have described, may not fully satisfy the health authorities of the State Health Department, but I think an examination similar to that described will eliminate a large percentage of the cows that are dangerous to the public health, if their raw products were used.

My experience of the past two years, although rather limited, has convinced me that an examination of this kind, made by a veterinarian called by the owner of the herd to make the examination inspires respect for that veterinarian and his profession. It does more than that: In a greater or less degree it removes the feeling that the milk producers are being oppressed unjustly by the health department.

On the other hand, the veterinarian who goes into a dairy section, and goes from farm to farm asking the privilege of examining the cows, explaining the advantage of having it done then, because he is in that locality and can do it cheaper than it can be done

at any other time, is putting veterinary services on the bargain counter. Such methods are not only unethical, but are professionally dishonourable; they brand the veterinarian as a *grafter*, and aid in widening the gulf between the health department and the milk producer.—*Jour. of Amer. Vet. Med. Assoc.*

Reviews.

VETERINARY REGISTER, 1917; price 3s. 6d. net.

The 1917 issue of the Register of the Royal College of Veterinary Surgeons is well up to date in all matters of interest to the profession. It is well compiled and arranged, and, although on the same lines as carried out in recent years, each issue appears to have some new and important features. The chief noticeable feature in the present volume is the number of members of the profession who are now holding military rank and doing their duty to their country in the Army Veterinary Corps. It is another instance of how each department can, if it sets its mind to it, become transformed rapidly, and in a very short space of time, from the quiet ways of peace to the violence of war.

The Register is a book which every veterinary surgeon should possess as a work of reference, and the energetic Secretary of the Royal College of Veterinary Surgeons is to be congratulated on the large amount of useful knowledge he has collected and condensed in its 458 pages.

VETERINARY BACTERIOLOGY.—A treatise on the Bacteria, Yeasts, Molds and Protozoa pathogenic for Domestic Animals. By Robert Earle Buchanan, Ph.D., and Charles Murray, B.Sc.D.V.M. Second edition; thoroughly revised. Published by Saunders Company, London and Philadelphia, 1916; price 15s. net.

This book, written and compiled by the two above-named professors at the Iowa State Veterinary College, is a useful one for veterinary bacteriologists and practitioners. It deals with the pathogenic bacteria, yeasts, molds and protozoa, and includes a section on "Bacteria and the resistance of the animal body to disease." There is a handy section on "Laboratory methods and technique," and a short one (all too short in our opinion) on the "Bacteria of water and food." Much more might have been written as regards "Milk: its constituents, contamination and examination," and this would have rendered the work far more valuable, to the British veterinarian at any rate.

The sixth section, which discusses "Infectious diseases in which the specific cause is not certainly known," is very instructive, comprehensive, and exact. It is instructive because it puts before the veterinarian a vast field of uncertainty (showing what need there is for research and investigation) as to the cause of many diseases; and it is exact (as far as it goes) because it acknowledges that the specific micro-organisms originating such affections as foot-and-mouth, rinderpest, hog and chicken cholera, pleuro-pneumonia, etc., are unknown. Many bacteriologists tell us that some of these specific bacteria are

known, but almost every individual country seems to have its fancy in the matter, and when each makes a claim, what can the neutrals do, if they are honest, but leave the matter in doubt? We think that the organism causing braxy in sheep might have been left uncertain, too; but the authors give it definitely as the "bacillus gastrumycosis ovis." They omit consideration of the bacilli of "scrapie," "trembling" in sheep, and "louping ill," altogether, perhaps because these diseases do not exist in America, or else their origin is still at the "back of the beyond" as far as bacteriologists are concerned. Some men in this country believe that they have discovered the organisms causing these diseases, but then there seems to be no finality even to scientific discoveries. We have always considered that there is a lack of useful, serviceable text-books for the veterinary bacteriologist here. This book will help to fill a gap, and will be a valuable volume of reference to the investigator and conductor of research. It deserves a welcome place on the bookshelves of up-to-date veterinary practitioners, those engaged in corporation, county, or government service and it will be found equally useful and valuable in the sanctorum of Medical Officers of Health.—G. M.

THE PATHOLOGY AND DIFFERENTIAL DIAGNOSIS OF INFECTIOUS DISEASES OF ANIMALS. By Veranus Alva Moore, B.S., M.D., V.M.D., Dean of the New York State Veterinary College, Cornell University. Fourth Edition; 1916; pp. xvi+593; illustrations in text, 120. Publishers: The Macmillan Co., New York and London; price 17s. net.

This standard American text-book has gone into its fourth edition, and the present volume has been revised, added to, and in parts re-written. Fresh matter in the work comprises a statement of the requirements for the inter-state shipment of live stock, and the Federal regulations for the veterinary inspection of meat. To the clinician the relation between symptoms in life and lesions found on *post-mortem* is of quite first rate interest and importance, and the study of comparative pathology is advanced considerably by the author of this text-book. The letterpress of the book is clear, concise, and well divided, and each disease has a few literary references appended to it, to enable the student to go further into a study of its cause and morbid anatomy, and to become acquainted with the results of original research in a few instances. Two of the most useful chapters in the book for British veterinarians will be those on "Infectious Abortion in Cattle" and "Hog Cholera." Full instructions are given as to the use of serum in swine fever. In the chapter on foot-and-mouth disease, where the question of differential diagnosis comes in, we think the author might have made his lines more valuable if he had referred shortly to the conditions that may be mistaken for epizootic aphtæ and given a description of them. As time goes on stomatitis of different kinds seems to be cropping up in new forms, and as a result we hardly believe to-day that the words, "The most difficult lesions to distinguish between are certain more or less pigmented depressions due to traumatism and foot-and-mouth disease lesions rather late in their course" are quite up-to-date. The range of the subject matter

of the volume is to the full extent of present day knowledge of infectious diseases, and protozoal no less than bacterial infections are discussed and explained.

Evidently, whatever may be the case in Britain, equine contagious pleuro-pneumonia is a well recognised disease in America, where fatalities may vary from 1 to 30 per cent. The chapters on "Immunity and Protective Inoculation" and on "Disinfection" are not the least noteworthy in the book. As regards the latter, it is curious that, almost without exception, authors when dilating on disinfection and disinfectants never mention or lay stress on one suitable for using in cow-houses, milk rooms and dairies, and yet a disinfectant for these places must possess special attributes and properties in order to be suitable and effective. The volume is well bound and illustrated. Practitioners, students, teachers, medical officers of health and meat inspectors may all study the book with profit and advantage.—G. M.

ANNUAL REPORT OF THE PUNJAB VETERINARY COLLEGE, CIVIL VETERINARY DEPARTMENT, PUNJAB, AND THE GOVERNMENT CATTLE FARM, HISSAR, FOR THE YEAR 1915-1916. Printed by Superintendent, Government Printing, Lahore. Price 9d.

Colonel H. T. Pease, C.I.E., has continued to act as Principal of the College, and Colonel Farmer as Chief Superintendent of the Civil Veterinary Department. There are now two separate courses at the College, a three years' one for military students, and a four years' course for native students. A post-graduate course has also been instituted to give advanced instruction in laboratory work, and contagious diseases, parasitology, and clinical diagnostics. The lack of a text-book in the vernacular hampered this teaching somewhat. Sixty-one students passed their first examination, 56 their second, and 49 their third. The illness and retirement of Mr. Gaiger handicapped the laboratory instruction. He was a capable member of the staff, and a reliable authority on Indian diseases. A new College was opened by His Excellency the Viceroy in December last, but a proposed new hostel for the students has been temporarily held up. The demand for graduates is far greater than the supply. The Principal is a strong advocate for a second vernacular Veterinary College in Northern India, and a better organisation of the veterinary services in order to turn out more well equipped veterinarians to cope with the work that is crying out to be done.

In the Civil Veterinary Department there were five chief members of staff, together with veterinary assistants who dealt with the treatment of contagious and other diseases, conducted operations, and took records of the breeding activities. The number of castrations was doubled, and cattle breeding showed gratifying increase, four new breeding farms being established.

Owing to shortage of water and insufficient canal supply, the Hissar Cattle Farm had a difficult year, but nevertheless, Mr. Branford and his staff did good work. Owing to the absence of rainfall, grasshoppers and crickets flourished, and did much damage. The Report can be obtained through Messrs. Constable & Co., 10, Orange Street, Leicester Square, W.C., or H. S. King & Co., 65, Cornhill, E.C.—G.M.

ANNUAL REPORT OF THE CIVIL VETERINARY DEPARTMENT, BIHAR AND ORISSA, FOR THE YEAR 1915-1916. Price 8d.

This Report, drawn up by Mr. D. Quinlan, M.R.C.V.S., is another record of valuable work done in a vast field. There is an increasing demand for veterinary assistants, and the service needs to be made more attractive in order to gain the necessary men to cope with disease. The reporting of scheduled diseases and the carrying out of inoculations occupy the constant attention of the Department, but the natives are prejudiced against the former, and in many cases resent the latter.

Itinerary veterinary assistants and veterinary assistants in charge of hospitals did good work, the former treating 54,904 new cases, and the latter 26,213. Shoeing forges did well and showed a profit in spite of the high prices of nails and iron. The two bull-breeding farms just about held their own, but the demand for bulls for improving local breeds was greater than the supply. Much pathological material was sent to the Raymond Research Laboratory for examination. The Report is on sale at Messrs. Constable's, Leicester Square, and H. S. King & Co., Cornhill.

Obituary.

THE LATE CAPTAIN H. ANTHONY, A.V.C.

Friends of Captain Anthony will be sorry to read that he has been killed whilst on active service on the Western Front.

As Officer Commanding a Veterinary Mobile Section his duties took him close behind the firing line, and one night in May he was the victim of an aeroplane bomb which fell near his tent and killed him instantly.

He was a graduate of the London College, from which he passed out in 1901. Joining up as a Territorial when the war commenced, he had proved himself a most capable and trustworthy officer, and his death has robbed the Service of one of its best young men, whilst his loss will be felt deeply by a large circle of friends with whom he was deservedly popular.

NOTICES.

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CAPTAIN BERNARD POOLE, CANADIAN A.V.C.
(Killed in Action.)

THE VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING;
MAJOR IN THE ARMY VETERINARY CORPS.
HONORARY MEMBER OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.
CORRESPONDANT ÉTRANGER DE LA SOCIÉTÉ DE MÉDECINE VÉTÉRINAIRE DU
BRABANT (BELGIUM).

Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

JULY, 1917.

Editorial.

THE VETERINARY SERVICE IN THE FRENCH AND AMERICAN ARMIES.

Now that the Americans are definitely our Allies, and will soon be fighting side by side with us in France, it is necessary that every department turns its eyes towards them to prepare for their reception.

Amongst them the Veterinary Department must not be forgotten, and as it is at the present moment in its infancy, and really only on its trial and in process of formation, it behoves itself to profit by the mistakes of other countries.

Those responsible cannot do better than to study the organisations and defects of both their French and English colleagues, and a perusal of a translation in our present issue from an article by Professor Leclainche, can be made with profit. By this it will be seen that there is much to be avoided, and there should be no question or discussion allowed upon one fundamental point—the Veterinary Department *must run its own show*. It must be independent, and have its own command. To be subordinate to any other department whatever is derogatory, and not for the good of the Army. It is a department as important and essential to the success of the service as any other, and, although not quite so large as some, it cannot be done without.

The French system is totally different to the English one, and, as will be seen by a perusal of Prof. Leclainche's article, it is not so satisfactory either to the personnel or to the officers of the corps as the English organisation. To be under the command of a combatant officer, often an old "dug out," is not conducive to good work, especially if the officer happens to be a self-opinionated man. The Medical Department is to have a controlling influence over the

Veterinary Branch of the American Army, and whether this will tend to success or otherwise remains to be seen.

The English method is much the best, and the great success of the British Veterinary Hospitals is a proof of it. Here we have thousands of men and horses, established in large camps, fed, rationed, watered, and medically or surgically treated, entirely under the command of veterinary officers—men with veterinary qualifications whose business acumen is tested every day.

The system, too, of appointment of veterinary officers to units is most excellently carried out, and the sick or injured horse has every possible opportunity to get well by rapid evacuation to a base hospital. The unit veterinary officer does prophylaxis and first-aid treatment, passing the animal on to Mobile Veterinary Section for transit to the base, under the guidance of the Assistant Director of Veterinary Services, who in his turn is responsible to a Deputy-Director of Veterinary Services, and finally to the Director-General.

To have to consult combatant officers as to whether or not certain things should (or can) be done, means serious delay, and probable loss of life; and, besides, the show should be our own, and we are quite capable of running it!

Let the Americans take warning of the many errors made by France and by England in the past, and get a real, strong start. That is what is wanted, and that is essential as a foundation.

We wish our Allies luck in their efforts to rise on a firm foundation, and they can each rest assured that they have the individual support of their British and Colonial colleagues.

General Articles.

THE VETERINARY OFFICER IN THE UNITED STATES ARMY.

FROM "The Amer. Journl. of Vet. Med." for May we learn that the veterinary corps of the army was established by Act of Congress on June 3rd, 1916. The allocation of veterinary officers as provided by law is not more than two for each cavalry regiment, one for three batteries of field artillery, one for each mounted battalion of engineers, seventeen as inspectors of horses and mules and as veterinarians in the quartermaster corps, and seven as inspectors of meat.

Applicants for service must be between the ages of 21 and 27. They have to undergo a rigid examination as to intellectual and physical qualifications, and they must be graduates of a recognised veterinary college or university. Six days are usually taken up in the examination of the applicants by a board consisting of three medical officers and two veterinarians.

Assistant veterinarians are commissioned with the rank, pay

and allowances of a second-lieutenant of cavalry, which amounts to pay of \$1,700 per annum, with quarters, light, fuel, medical, dental and hospital service free, and a month's vacation each year. After five years' service they are eligible for first-lieutenants at \$2,000 per year; and after 15 years for captains, and after 20 years for majors, at a maximum salary of \$5,600 a year. After each five years' service up to twenty years the pay is increased 10 per cent. A captain with fifteen years' service will receive \$2,400 plus 30 per cent., or \$3,120 per annum, with allowances. The retiring age is 64.

A defect in the present constitution referred to in *The Journal of the American Veterinary Medical Association* is that no provision has been made for a Veterinary Reserve Corps. The age limit as laid down by law will hardly produce a sufficient supply of veterinarians for the present emergency, but no doubt revision of this instruction will be made if occasion requires and it is proposed that "for the purpose of securing a Reserve Corps of Veterinary Officers for military service as temporary officers in the regular Army, the President be authorised to issue commissions to citizens of the United States who are graduates from a reputable veterinary school, under such restrictions and with the same rank as is given to officers of the Medical Reserve Corps."

REMARKS ON THE FRENCH ARMY VETERINARY SERVICE.*

By M. E. LECLAINCHE,

Inspector-General, Head of the Sanitary Services to the Minister of Agriculture.

THE organisation of the veterinary service of the army is now being discussed in the limited number of professional journals which have survived the state of war.

Of the few accounts given all coincide in being unfavourable; the Army Commission of the Senate has judged certain procedures severely and drawn up parliamentary statements involving grave criticism of various subjects. The public press has widely taken up the question. In addition we possess the advice of allied or neutral authorities. In saying that the English do not at all regret never having adopted our methods, I only interpret in a slight way their kindest appreciations. Comparing the French and English services after a visit to the front, Marshall, the American, thus records his impressions: "The French Veterinary Service was not suitably organised and prepared before the outbreak of hostilities. They have not had time to deal with these questions since." The irony is cruel; but the view is just. The foreign military missions which recently visited our *Dépôts des Chevaux Malades* could not conceal

*Translated from the *Revue Générale de Méd. Vet.* (G.M.)

the unfavourable impression which the working of these establishments gave them. It is quite certain that the actual organisation, with innumerable regulations arranged for peace time, does not answer at all to the present exigencies which nobody had foreseen.

The conviction had established itself that the veterinary service would be non-existent in time of war. The short campaign counted on need not concern itself, it was thought, with the care and maintenance of horses. This extraordinary answer of a certain veterinary surgeon may very well be quoted. A soldier expressed astonishment during the first days of mobilisation at the absence of all therapeutic material. The veterinarian said: "With a revolver and some salt water the veterinary surgeon on campaign has all that is necessary to fulfil his mission." One of the most distinguished veterinarians in the army wrote to me some years ago: "To keep the cavalry in a good state is our essential and only mission; our part in the campaign will be *nil*; every horse that cannot follow ought to be sacrificed on the spot."

I bring forward these recollections without any mental reservation. One could not ask the veterinarians to profess any opinion other than that of their great army chiefs on the general conduct of the war.

But whilst under the pressure of events every arm and service has abandoned some faulty ideas and obsolete methods, the veterinary service has preserved intact its dogmas and regulations.

In the presence of an unforeseen task for which it was not at all prepared, the veterinary service had to reorganise entirely. It had to replenish all its departments; a great work might have been accomplished; it could have rendered striking services to the army and to the country. In the face of new conditions, it had to establish the rules of hygiene of a formidable cavalry, and to determine simple and effective methods of treatment; the creation of field hospitals, of lazarets, of surgical centres, the economic use of convalescents and incurables, the organisation of the remounts in this and foreign countries, marine transport, investigation and prevention of exotic maladies, the care and sanitary supervision of the stock in the military parks, the control of home and imported meat, and that of preserved stuff in France, and in the new sphere, the management and preservation of meat, the different operations of the tripe house and pork butcher, and the recovery (which is so valuable) of the bye-products of the abattoir and horse-slaughterer. All these demanded full activity on the part of veterinarians, and the employment of every expert available.

The men capable of directing each of these services were known by everybody, and marked down at once by their previous situations and by their work. It is doubtless futile to indulge in recrimination;

but is it not lamentable to see veterinary surgeons sent at great cost to buy horses in America who have specialised in the bovine clinic, or in vine culture ; to see appointed, under still more strange conditions, a controller of the manufacture of preserved stuff in South America ; to see the inspection of frozen meat at a large port entrusted first to a Parisian drayman, and then to an automobile manufacturer !!

The organisation of the *Depôts des Chevaux Malades* is a defiance of all the rules of common sense. The maintenance of useless, costly and injurious staffs acts and reacts against us. The juxtaposition of infirmaries and mobile remount depots has had consequences foreseen by veterinarians from the very first day ; thousands of healthy horses have contracted mange and lymphangitis, to spread them afterwards in the corps or in the country. Can one admit for a moment that an autonomous veterinary service would have committed such blunders ?

One knows the stolid answer returned to Mons. Deputy Brousse when he asked : " What reason is there for keeping so many cavalry commanders and lieutenants in command of depots at the back of the lines ? " " It is because military regulations prescribe that the object of the veterinary service in the field is to ensure the care of horses, but not to exercise any control over horse depots."

This recalls to me the joke of an army veterinary surgeon reviewing his impressions after eighteen months campaigning : " Our rôle can be defined by the following decree :—Art. 1.—The veterinary service in the field is non-existent. Art. 2.—The inspectors of remounts are appointed to see this present decree carried out."

No technical direction—a veterinary inspection merely a matter of occasional advising, ignoring all personnel, stoically endorsing responsibilities which nobody deems incumbent upon him to carry out. No active committee capable of furnishing indispensable advice. No centralisation and direct utilisation of the numerous teachings which the experience of war furnishes. At the C.Q.G. a cavalry officer, allocated as a figure to the position of Director of Service, who gravely annotates some reports on the pathogenesis of glanders ; some army principals receiving no other inspiration than that of their own experience, unravelling them as they can, provided with vague attributes, and merely tolerated by the command. In some regions, directors of mature age, watching that no initiative disturbs the established order and their quietude, masters at the preparation of impeccable " lists " placed under the all-powerful protection of the local command. Above all an encumbering and sterile mass of waste paper ; reports which nobody reads, statistics which nobody believes, some " lists of losses " reduced by thousands, in triplicate, signed,

overlooked, and certified by multiple authorities, concluding solemnly by putting all animal death to the expense of the State.

"With the hard experience of a war so prolonged," says Mons. Henri Paté, "and in order to galvanise the system into life, the command must borrow the most active types of organisation, of division of work; one still sees the army over-weighted with a store of superfluous machinery, and with offices held by men who exercise no useful rôle."

Will the reorganisation of the veterinary service be realised at last? Will the service leave Parliament once more to take the initiative? A near future will tell us. In any case the essential principle of reform is easy to indicate.

Give to veterinary inspection, under the authority of the Director of Cavalry, the technical direction of all that concerns hygiene, and the treatment of the animals of the army and utilisation of animal products; give him, under the same authority, all powers as regards the redistribution and the better utilisation of personnel. Assisted by advisers that he will appoint, the veterinary inspector could give the necessary directions; he could exercise by himself, or through his delegates, the necessary controls. He could send back to agriculture, which can no longer do without them, the 500 veterinary surgeons that have been called up.

This is what must be realised, not to satisfy egoistic interests which are of little account at the moment, but for the safeguarding of the interests of the country.

G. M.

Original Communications.

"STOMATITIS CONTAGIOSA" IN HORSES.

By A. C. BURTON, M.R.C.V.S.,

Captain Army Veterinary Corps.

It is a contagious disease characterised by vesicular eruptions in the mouth with subsequent more serious and characteristic lesions therein; similar lesions on m.m. of oesophagus and stomach, with an acute gastro-enteritis: occasionally, also, an eczematous coronitis.

There is no doubt that the condition is different from the disease described by Friedberger and Frohner as stomatitis contagiosa pustulosa. The symptoms, duration of disease, the actual lesions and prognosis, cannot be compared. There is apparently little literature on "Foot-and-Mouth Disease in the Horse."

Horses readily contract the disease. Mules are not so susceptible, but are by no means immune. It is transmissible to man—my Staff Sergeant, a Corporal dresser, and myself have contracted it. Here

the disease was of short duration, and to be described as mild, though very painful, confined to the mouth with symptoms and lesions similar to those to be described.

We have still no definite knowledge of the nature of the virus. Much work in this direction is now before us, and the results may be of far-reaching importance. It must be presumed that the virulent material is contained in the vesicles in the mouth, and thus in the saliva; also, from the gastric lesions, in the excreta, as well as in the vesicles and serous exudate of the foot lesions. Thus the possible media to affect healthy animals are very numerous, and we have abundant proof of the easy communicability.

The virus seems to be easily destroyed—both foot and mouth lesions are speedily arrested with the aid of mild antiseptics; my own case answered readily to simple treatment. There seems evidence that the material from mouth and foot lesions is inactive after forty-eight hours.

There is reason to think that the period of incubation is short, twenty-four hours to three days. Further research should enlighten us on this and other points.

Any immunity conferred by an attack appears to be of short duration only. Re-infection has taken place in less than two months (or, was it that "recovery" from first attack was only "apparent" and not complete?). It is not a benign disease; under certain conditions it is malignant, with both serious and fatal terminations.

It seems probable that sudden outbursts of the disease are influenced by climatic or other conditions. Or, is it severe weather, exposure, and harder work are sufficient in themselves to lower the natural resistance to this disease?

All classes of horses are affected—heavy draught, light draught, and riders. Age is not a factor—young horses contract the disease as readily as the old. Mules are not so frequently affected, they are by no means immune. Recovery in the mule is longer delayed. Generally speaking, the "condition" of the animal seems to play a great part in the "progress" of the disease.

SYMPTOMS.

The initial symptom is an inflamed condition of the mucous membrane of mouth or lips. This is speedily followed by the formation of vesicles. These vesicles:—

(a) *Of the lips*—show a preference for the margin of skin and mucous membrane, are in this position, small and have a tendency to rupture quickly rather than to coalesce before rupturing. A straw-coloured serum is exudated, and gives a "crusted eczematous appearance," which may extend from the one angle of the mouth to the

other, on either or both lips. A few such vesicles may appear on the skin itself. They are quite common on the mucous membrane well away from the margin of skin and m.m., and in this site are larger and frequently coalesce before bursting. The resultant lesion is irregular in contour, may be just superficial, or deep and ragged, extending almost throughout the substance of the lip. The latter must not be considered of traumatic origin.

(b) *Of the gums*—quite common, especially at the base of the incisors, in which position the resultant lesion is small in extent. Away from the teeth the subsequent lesion is inclined to be larger, more irregular in shape, deeper and more ragged and will extend to the bone.

(c) *Of the upper and lower palate*—quite common, but the resultant lesions are not as a rule so severe, are generally in the neighbourhood of the incisors. The "bars" are a favourite site, and here the lesions are, at times, of considerable area.

(d) *Of the mucous membrane of cheeks*—not uncommon, but do not tend to a severe type. They (the resultant lesions) give the appearance of injuries by molar teeth, but must not be confounded with such.

(e) *Of the tongue*.—Here they are the most severe met with in the mouth. They are nearly, if not always, secondary to one or more of those already enumerated. They coalesce freely, and the resultant bleb is of considerable area. It is seldom that the vesicles or blebs are seen on the tongue, for they burst almost on formation. The mere handling of your patient and its tongue is sufficient to cause the rupture, and the epithelium comes right away; this leaves an angry-looking raw patch. The dorsal surface is that most frequently affected; sometimes the edge of the tip of the tongue is alone affected. Some severe lesions of the tongue must be noted, viz., where practically the whole of the dorsal surface of the tongue is denuded of epithelium.

All the foregoing lesions vary in severity; but it is not noticed that the severity of same is in direct relation to the emaciation of animals—that is, a good condition animal may show very severe lesions; a greatly emaciated animal may only show slight lesions. All the animals show a marked resistance to the handling of their mouths and lips. This would appear only natural where the lesions are severe, but it is general, tending to prove that the affection is a more painful one than the lesions at times would suggest.

Salivation is both variable and recurrent. Some animals will not salivate throughout the course of the disease. With lip lesions only salivation is rare. It is sometimes the first symptom where the buccal mucous membrane is inflamed, but no characteristic lesion has

yet developed. It will cease, only to recur at intervals of a few days to a few weeks, and will even take place one month after definite diagnosis. Roughly, salivation may be said to take place only where tongue lesions exist. The profuseness of salivation, however, is no indication of the severity of the lesions.

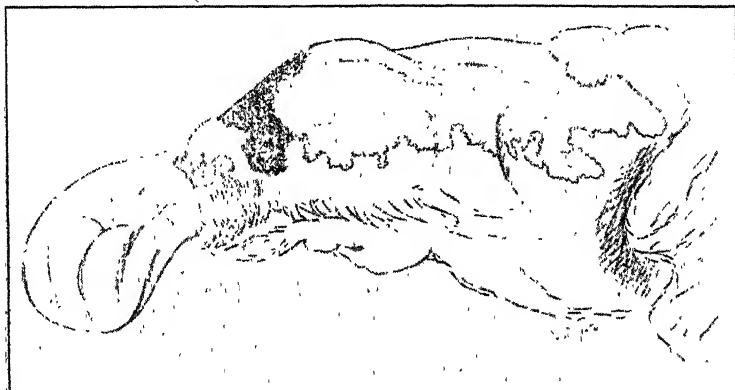


Fig. 1.—Typical fresh lesions on the Tongue.



FIG. 2.—Partly healed Lesion on the Tongue.

In a great number of cases, and in practically all severe ones, the odour of the mouth is very offensive. It is not merely a sour smell—as one would meet in cases of ordinary digestive derangements—but a stench more akin to that of the breath of an animal suffering from gangrenous pneumonia.

Colic is a frequent symptom, more especially in cases running an unfavourable course, and is here due to gastro-enteritis, a notable feature of the disease.

In a few cases the disease has been accompanied by icterus, but probably the latter has been due to causes other than stomatitis.

Pulse.—A rapidly-falling one, till, in the emaciated, it is scarcely perceptible. Visible mucous membranes highly injected.

Temperature.—Fever is present only in these very severe cases and in those where abdominal lesions supervene, and then may reach 103° or 104° . Provided the mouth lesions are not severe, the appetite remains good; there is little or no constitutional disturbance, and no appreciable ill effects. On the other hand, severe lesions either of lips or tongue are of themselves sufficient to *prohibit feeding*, and your patient wastes rapidly. It is not so much that the appetite fails, but that prehension of food is rendered difficult and painful. Although a fat animal may waste very rapidly, from either tongue or lip lesions, it must be noted that (1) recovery in such animals is usually more rapid; (2) an unfavourable course with gastro-intestinal affection is less common, *i.e.*, the condition of the animal plays a great part in the progress of the disease. With the healing of the mouth lesions, recovery may be uninterrupted and complete. The healing process varies from a fortnight to two or three months; but one cannot be sure of recovery having taken place, as lesions further on in the alimentary track are very common, and will develop at variable intervals, *viz.*, at one and the same time as those of mouth, also after complete healing of the mouth lesions; one may say, from ten days to a month or longer after the initial mouth lesions. It must be noted that an animal may apparently make a recovery as far as can be judged from mouth lesions, will feed again well, but will continue to waste, *i.e.*, it will continue to lose condition for reasons other than an insufficiency of food being taken. Here one may suspect, especially if accompanied by colic, that a gastro-intestinal affection has taken place. It is, of course, obvious that in cases of complete recovery one can give no proof of a gastro-intestinal affection having taken place. Healed mouth lesions are quite common in animals both with and without a history of stomatitis. It is noteworthy that *healed* gastric lesions have so far been met only (*P. M.* examinations) accompanied with active lesions, *i.e.*, there is yet no conclusive proof of gastro-intestinal affection with subsequent recovery.

Foot Lesions.—Best described as an *eczematous coronitis*. They are no doubt a symptom of the disease under review. A synthetic analysis will not permit any other conditions to account for their presence. The affection is seen in one or more feet, is very painful, and develops rapidly. An animal sound one day will be acutely lame the following; vesicles appear almost at once, rupture, and the straw-coloured exudate trickles down the wall of the hoof. The heel is the part most often primarily affected, and from here it spreads rapidly round the entire coronet at times. The serum coagulates and gives the appearance of a thick crust or rash round the part. Where present, a distinct separation of horn from skin results,

and this is of considerable depth. Where all four feet are affected, locomotion is most difficult and painful.

These lesions manifest themselves at variable times, but invariably at the "commencement" of the disease. They are observed at the same time as diagnosis of mouth lesions; or at variable intervals from two to eight days, after those of the mouth. Again, foot lesions are recorded in cases of what was considered a second attack. These lesions, like the mouth lesions, resemble foot lesions found

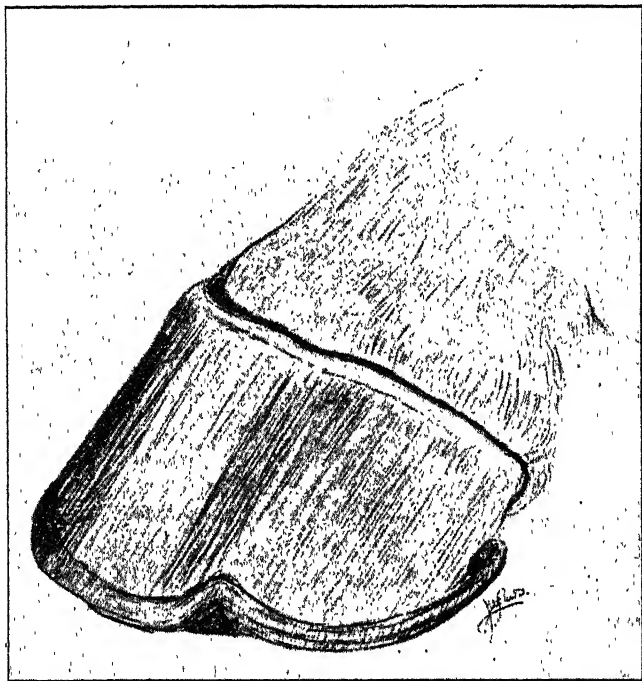


FIG. 3.—The Lesion on the Coronet.

in the foot-and-mouth disease in cattle. These foot lesions have not yet been observed in cases where symptoms or lesions of the disease were not found in the mouth.

DIAGNOSIS.

Sufficient has been stated under previous heading to render diagnosis easy.

PROGNOSIS.

Must be guarded. The disease too frequently runs an unfavourable and even fatal course.

POST-MORTEM LESIONS.

All the *ante mortem* lesions, so far described, may be found in one stage or another. Where very severe mouth lesions are present



FIG. 4.—Stomach Lesions found in the same animal as the Tongue Lesions of Fig. 2.

and still active, the alimentary tract may be found completely devoid of food stuff.

Emaciation is marked. Mouth lesions may be quite recent and extensive, or completely healed. At times the acute inflammation has subsided, but the epithelium has not repaired itself. Where the mouth has allowed normal feeding, the stomach and intestines are found well supplied with foodstuff, but the carcase, nevertheless, emaciated.

Lesions, as on the tongue and lips, may be found on the mucous membrane of the oesophagus. They are quite common in the stomach, and here, again, will be found to vary both in severity and age, as also in position; but are invariably of same character as in mouth. Their favourite site is the junction line between the villous and cuticular mucous membrane, but may, and do, invade either or both mucous membrane.

Where gastric lesions are present, gastro-enteritis is invariably found, and of a more acute form than that seen in our animals due solely to digestive derangement or other milder troubles.

The characteristic lesion of the disease has not yet been found in the intestines. One may assume that the gastro-enteritis, if not due to the actual presence of the specific organism, is due to the poisons elaborated by them, and these latter may also account for the spasmodic convulsions and tetanic symptoms seen in the last stages of the disease.

TREATMENT.

At times one meets with cases where treatment is of no avail. Local treatment, *i.e.*, to mouth, is not only indicated, it is of great value. It not only *cures* the milder lesions, but it will arrest the more severe ones and prevent the case taking an unfavourable course with subsequent gastro-intestinal affection. Of drugs, Pot. Permang., Pot. Chlor., Alum, and Cupri. Sulph., have a beneficial effect. The use of a caustic is contra-indicated. It would appear that any antiseptic, and that of weak strength, is sufficient for our purpose as the virus seems very easily destroyed by the most simple one. Frequent irrigation and cleansing of the mouth is the treatment rewarded with best results.

After trials of electuaries, mouth washes, etc., of the drugs mentioned and others, there remained ample room for improvement. Our present mode of treatment has given very satisfactory results. To commence with, the most serious cases were put together in one stable; all animals of one side were treated in the manner to be described; the animals on the other side (practically head to head) were treated by other means and purposely, in some cases, not treated at all.

Very marked improvement was noted in those animals treated thus: Three, four, or as many times a day as circumstances permit, the dresser walks down the gangway in front of the horses' heads. He carries on his back the ordinary Vermorel sprayer containing 5 gallons of clean, cold water to which has been added $\frac{1}{2}$ ounce of Pot. Permang. The nozzle of the sprayer is covered with a piece of rubber hose pipe, through the end of which several holes have been made. Neither the lips or mouth is touched by the hand, but the animal held by the head collar, the rubber nozzle is passed between the lips at the corner of the mouth and into the mouth. The pump is worked, and the mouth is thus thoroughly irrigated and cleansed. The animal, far from resisting this, much appreciates it, and actually manifests this appreciation. The results are such that one need look no further for treatment. A plentiful supply of clean, cold drinking water is used to the best advantage by these patients. It will readily be understood that soft and semi-liquid foodstuffs alone can be used; for this purpose crushed oats, a little bran, and a few roots, with the addition of linseed, well boiled and mixed, suits admirably, and can be of different consistency to suit the case.

It must be remembered that my remarks have referred, in great measure, to the disease in already debilitated animals. There is evidence that the disease answers more readily to treatment in cases of good condition animals.

I attach sketches of the lesions found; those of the tongue and stomach are from one and the same animal, and drawn soon after destruction.

TUBERCULOSIS IN THE HORSE.

By F. CHAMBERS, F.R.C.V.S.

Capt., Army Veterinary Corps.

DURING the last six months four cases of tuberculosis have been observed. The diagnosis was only made on *post-mortem* examination. Tuberculosis is known to be so rare in the horse that one seldom suspects the presence of the disease unless the animal exhibits that marked stiffness of the neck, caused by an *ostitis* and *periostitis*, which has become to be recognised as a striking symptom of this disease in the horse. All the four cases which I have recently observed were, with the one exception, sent to the hospital as cases of debility. The exception was admitted for sand-colic. It was a grey gelding, 10 years old, in very poor condition, and purging badly. The usual treatment for sand-colic was prescribed but with little result. Eight days after admittance this animal developed symptoms of acute pneumonia in the morning, and died the same evening. *Post-mortem* examination revealed a quantity of sand in the first

portion of the large colon. The mucous membrane of the last few feet of the large colon was wrinkled, and the coat of the bowel was considerably thickened. The mesenteric glands were much enlarged. Spleen and liver normal. There were two gallons of fluid in the thoracic cavity. The lungs were adherent in places to the chest wall, and congested; the pleura adjoining the heart was much inflamed. The pericardium was one inch in thickness and adherent in places to the lungs, and the amount of pericardial fluid was slightly increased. Smears were made from the pericardium and interior of the mesenteric glands, and tubercle bacilli were found in great numbers. The other three cases were purely abdominal, and a description of the one will answer for all three. During life the symptoms exhibited were those of debility with progressive weakness. No diarrhoea was observed. All three cases were destroyed, as no improvement was noticed after three months' treatment.

Autopsy.—Excess of fluid in abdominal cavity. The stomach and intestines appeared normal, except that the mesenteric glands were much enlarged, and firm in consistency. No caseating or calcareous areas could be found in any of these glands. The spleen was enlarged and filled with tubercles ranging in size from 5 mm. to 4 cms. in diameter. They were grey in colour, firm to the touch, and many contained caseous material. The liver appeared to be normal, but the portal gland was enlarged. Lungs and bronchial glands normal. Heart normal. Brain and spinal cord not examined. Smears in all cases were made from the cut surface of the mesenteric glands and caseating areas in spleen and tubercle bacilli were readily found and were numerous.

During life tuberculosis was not suspected in any of these cases, and I have put these cases on record as I consider that it would save time and expense if all cases of debility that do not make headway in a few weeks were tested for tuberculosis. One cannot consider that tuberculosis in the horse is by any means common, but I am inclined to think that it is much more prevalent than is usually thought.

THREE CASES OF EQUINE SARCOPTIC SCABIES IN MAN.

BY THOMAS PARKER, F.R.C.V.S.

Veterinary Officer for the City and County of Newcastle-upon-Tyne.

IN Neumann's standard work (Dr. George Fleming's translation) on the parasites and parasitic diseases of the domesticated animals, under the heading of "Communication of the Sarcoptic Scabies of the Horse to other species of Mammals," it is stated as follows:—

"(a) *Man.*—The sarcoptic scabies of the horse may be transmitted to man, although this occurrence is comparatively rare."

“(b) *Domesticated Animals*.—Sarcoptic scabies of the horse appears to be capable of transmission to the bovine species, although up to the present time no one in practice has observed this form of mange on cattle. . . . Neither is there any more authority for stating that horse mange may be communicated to the sheep, goat, dog, etc.,”

Before proceeding further, I would like to point out that in March, 1900, McFadyean placed on record (“*Journal of Comparative Pathology and Therapeutics*”) a case which had enabled him to demonstrate, by positive evidence, the existence of sarcoptic scabies as affecting the bovine species.

Neumann quotes a number of interesting cases where man had contracted the disease from the horse. The following cases which have come within my own experience may be of some interest :—

(a) Between June 6th and 20th, 1902, whilst on duty at the Field Veterinary Hospital, Kroonstad, Orange River Colony, South Africa (during the South African campaign), I had charge of—besides other cases—a large number of horses and mules affected with scabies. For some reason or other a commanding officer doubted the contagious nature of the disease, and with the view of removing that doubt, I proceeded to one of the kraals in which were between thirty and forty horses very badly affected, but which, fortunately for the particular object in view, had not been subjected to any treatment. With sleeves rolled up, I took a number of deep scrapings, and then immediately went into the surgery and prepared a few specimens on slides with glycerine. On examination under a low power, numerous live acari belonging to the genus *sarcoptes* were found. Within a day or so both my arms began to be very itchy, followed by the development of well-defined hæmorrhagic spots. The irritation appeared most when exposed to the hot sun, and during the night. In the course of a few days the eruption subsided, and gradually disappeared, the only treatment adopted being a liberal application of soap and water. Some days later, whilst daily castrating horses, my hands and arms were frequently washed in a solution of perchloride of mercury, and the irritation previously experienced never returned.

(b) In January, 1916, whilst making enquiries into the history of an outbreak of sarcoptic scabies affecting a number of horses in each of two studs within the city, it was found that the groom, who had been attending the horses of one stud, had some weeks previously reported his suspicions of mange to his superior officer. A veterinary practitioner was then called in, and, after making an examination, prescribed a physic ball, the condition being considered one of a temporary nature due to some dietetic trouble. Some days later the groom noticed the development of a number of small spots on his fore arms,

accompanied by severe itching. These, however, gradually disappeared after being subjected to treatment for some days. In the meantime, the disease continued to make progress on the particular horse concerned. Finally, one morning the animal, whilst endeavouring to scratch its head with the off hind foot, got the calkin of the shoe fixed to the halter shank, and fell and was injured. The veterinary practitioner was again called in, and on this occasion quickly recognised the existence of suspected parasitic mange, and, without further delay, reported it to the local authority, hence my visit.

(c) On April 3rd, 1917, in response to a telephone message, I visited a stable within the city and examined a stud of ten horses. Of these, eight were found affected with mange, the clinical symptoms being typical of sarcoptic scabies. In the majority of cases the lesions were distributed over the head, neck, shoulders, withers, chest, loins and croup regions. Deep scrapings were obtained from two of the animals and on examining these microscopically sarcopts were found present, which placed the nature of the condition beyond all doubt. On visiting these premises a few days later the horse-keeper came to me and asked what I thought was wrong with his arms. Both fore arms presented numerous hæmorrhagic spots, which he stated were very itchy, and most particularly after he went to bed each night. The condition presented in this case was very similar to those of the two previously described cases, particularly in that the sensation of itchiness was aggravated by warmth, and that the condition was comparatively quickly got rid of by simple treatment. Furthermore, the lesions were in all cases present on the fore arms, and in the latter case they were present behind the right shoulder, and on the shins—probably spread there by the patient himself.

THE TEMPERATURE REQUIRED FOR THE "INACTIVATION" OF MULE BLOOD FOR THE COMPLEMENT FIXATION TEST FOR GLANDERS.

By J. B. BUXTON, F.R.C.V.S., D.V.H.,

Herne Hill, S.E.

DURING the past two years it has been necessary to test blood samples from a large number of mules for glanders by the complement fixation method. It was found early in the course of these tests that an unusually large number of animals gave a definite positive or indefinite reaction. Control tests by means of the agglutination reaction were frequently indefinite, there being a partial clumping of the organisms in all dilutions sometimes as far as the ninth and tenth tubes. The subcutaneous mallein test could not be accepted as definite owing to the occasional occurrence of large oedematous swellings at

the seat of inoculation, although these swellings did not present the characteristic of a typical mallein reaction. The intradermo palpebral reaction was usually found to give consistent results. *Post-mortem* examination of certain animals which had given a positive reaction to the complement fixation test failed to reveal the presence of glanders lesions. The indefinite reactions to the complement fixation test suggested that the mule serum had not been sufficiently inactivated, although it had been heated for half an hour at $58^{\circ}\text{C}.$, and that the anti-complementary bodies had not been destroyed.

The following experiments were therefore carried out to determine at what temperature and with what period of exposure to that temperature the necessary degree of "inactivation" was obtained.

Mule.	Temperature to which serum was heated.	Length of time subjected to heat.	Hæmolysis.	Result.
1	$58^{\circ}\text{C}.$	$\frac{1}{2}$ hour	—	Inactivation incomplete.
2	"	"	—	" "
3	"	"	—	" "
4	"	"	—	" "
5	"	"	—	" "
6	"	"	—	" "
7	"	"	—	" "
8	"	"	—	" "
1	$60^{\circ}\text{C}.$	$\frac{1}{2}$ hour.	+	" complete.
2	"	"	—	" incomplete.
3	"	"	—	" "
4	"	"	—	" "
5	"	"	—	" "
6	"	"	+	" complete.
7	"	"	—	" incomplete.
8	"	"	+	" complete.
1	$60^{\circ}\text{C}.$	1 hour.	+	" "
2	"	"	+	" "
3	"	"	—	" incomplete.
4	"	"	+	" complete.
5	"	"	+	" "
6	"	"	+	" "
7	"	"	—	" incomplete.
8	"	"	+	" complete.
1	$62^{\circ}\text{C}.$	$\frac{1}{2}$ hour.	+	" "
2	"	"	+	" "
3	"	"	+	" "
4	"	"	+	" "
5	"	"	+	" "
6	"	"	+	" "
7	"	"	+	" "
8	"	"	+	" "

The blood samples in the above test were obtained from mules which had failed to show a reaction to the intra-dermo palpebral test, and had failed to react or had given a non-characteristic reaction to the subcutaneous and agglutination tests. Two of the above animals had failed to show glanders lesions on *post-mortem* examination.

The serum from a mule known to have had glanders was then tested as follows :—

Mule.	Temperature to which serum was heated.	Length of time subjected to heat.	Complement fixation titre.
a	60° C.	1 hour.	·02
	62° C.	$\frac{1}{2}$ hour.	·1

The above experiment demonstrated the fact that, while the lower temperature failed to completely inactivate the serum, the higher temperature did not destroy the specific antibodies, while destroying the anti-complementary bodies.

It was subsequently found that while an exposure of 10 minutes at 62° C. failed to completely inactivate the serum of a non-glandered mule, there being incomplete hæmolysis, as shown by a faint haziness, with quantities of ·2 and ·1 cc. of serum respectively, an exposure of 15 minutes at the same temperature was sufficient to produce complete hæmolysis with all dilutions.

As no reference has been found in current literature dealing with this peculiarity of mule blood the foregoing note is published with a view to the prevention of a similar indefinite result in the testing of mule serum by the complement fixation method.

DROPSY IN SHEEP.

By R. HUDSON, F.R.C.V.S., *Retford*.

THE occurrence in camels of a kind of dropsy of the tissue as the result of drinking water after long abstinence reported in the *VETERINARY JOURNAL* for May by A. S. Leese, F.R.C.V.S., calls to mind a case I had in a flock of ewes.

Being at a farmer client's one evening when word was brought in that two sheep of a flock were showing difficulty in breathing, and were swollen about the nose, we decided to drive over and see them. On the way I learnt that the ewes had been sent to another farm two or three days previously—a distance of 7 or 8 miles. The lambs had been weaned before they went, and the ewes kept near home for two or three days, grazing lanes with a view to giving them exercise and preventing udder troubles.

On arriving at the field I found it a very bare, burnt-up pasture, a water-barrel near the water supply, the water being run into a trough holding about 8 gallons.

The first sheep to be examined was down, breathing with great difficulty owing to swelling about the nostrils. This swelling extended over the region of the submaxillary space, cheeks, lips, and nose; was painless; ; pitted on pressure. Around the nostrils mucus had accumulated and dried, making respiration still more difficult. The membranes were pale, ears cold, fever absent.

The next sheep examined showed similar symptoms, though not quite as bad; and on going through the flock many were found to be swollen under the jaws (choked) and about the nose, but they were feeding, and appeared all right otherwise.

I was puzzled to know what the cause of the dropsy might be, and must own that the owner and myself got a perfect fright.

It did not appear possible that the two ill sheep could live long. Many others—probably half of the 200—were in some degree affected, and might develop worse symptoms.

Slaughter of the two seemed the best thing to do, but there was nobody to do it, so we decided to leave them alone until morning.

On the way home we called at an old farmer's, and asked him if he had had similar trouble; but, with the exception of one case of "swelled head" in a sheep, he could not remember anything of the kind, and he had been there about fifty years.

Visiting early next morning, I was surprised to find the two ewes (which should have been dead) grazing, and looking all right except for slight fulness about the muzzle. Difficulty in respiration had vanished, and they were active enough to avoid capture. Other sheep were worse than on the night before, but after the experience of the two early cases I regarded them less seriously.

The bad cases were driven into a pen, and a dose of mag. sulph. administered, and mag. sulph. was added to the drinking water.

In a few days the flock was all right.

Examining the facts of the case it was evident that circumstances had tended to bring about a condition of thirst in the sheep—dry weather (meaning probably some fever), grazing on a waterless lane, the journey on dusty road. Arriving at the field, water was trickled into the trough, and although the quantity could not have been large because the barrel was a small one, it is possible it was cold.

It is evident that it was not the quantity of water taken that brought about blood dilution and allowed the escape of watery elements; but rather the coldness of the water, which produced nervous derangement and loss of control over the capillaries.

I have since learnt that sheep are particularly liable to this dropsy from drinking water, when heated, though it is not common in my district.



FIG. 1.—Showing Swelling of the Lips and Cheek.



FIG. 2.—Shewing Swelling of the Lips and Submaxillary Space.

INTERMEDIATE OBJECTS AS CARRIERS OF DISEASE.

By G. MAYALL, M.R.C.V.S.

IF absolute cleanliness of the surroundings of a sick or diseased animal was promptly and effectively carried out, there would be little need to concern ourselves with any precautions to prevent the spread of contagion or infection through inanimate objects about or in contact with the subject. True hygiene will aim at limiting the deposition of infectious agents on a patient's entourage, and render those that arrive there as harmless as possible by a quick removal and subsequent sterilisation of the area or object involved. Cleanliness will always be the first and most useful handmaiden in preventing and checking the spread of disease. One of the objects of the notification of infectious maladies is to curtail the spread of centres of contagion; and to deal thoroughly and effectively with the abode of the afflicted. Hence in human medicine notification generally means removal of the patient to a more suitable dwelling, where all has been planned to deal well with the complaint from which the patient suffers. The room or house the ailing subject has left is dealt with by disinfection and sanitation. In our case we are often handicapped by the places in which our charges "live and move and have their being." Many of them, if not actual homes of disease, certainly cannot be described as aids to the overthrow of the spread of infection.

There has always been, even in normal times, a tendency to be somewhat lax in the carrying out of efficient control and supervision of the movements of large bodies of animals. Infection carriers have escaped observation until they have scattered in a lesser or greater degree the germs of disease. The inanimate objects with which they have come in contact at resting places, on roads, in carts or waggons, at lairages, on the railways, or on board ship, remain to infect subsequent animal passers-by. There are not a few diseases highly infectious, and quickly spread, where the people concerned are in no way urged or compelled to notify or take any precautions to prevent the spread of infection. If it can be shown them that great economic loss results to the country, to trade, or to commerce by the neglect of sanitary and hygienic precautions, their assistance and co-operation in overcoming the danger of the spread of disease through inanimate objects that carry or harbour the germs of contagion, will be willingly given. The control of measures of sanitation and hygiene must, however, be in the hands of men having an intelligent idea of the objects to be aimed at, and with full power to see that any regulations or instructions are adequately carried out.

On the return of animals and men from the war, the importance of attention to the cleanliness and disinfection of cars, trucks, yards,

stations, and boats will be very evident. Hygienic precautions in connection with a few diseases, such as influenza, strangles, ring-worm, grease, etc. (maladies about which official regulations are strangely silent), will prevent much avoidable loss and increase the confidence of the public in the carrying companies, and those firms concerned in the trade and transit of the community. The expense involved in the carrying out of disinfection is no valid objection by companies or individuals to the duty which devolves upon them of preserving the health of animals and preventing the spread of contagious or infectious diseases.

Intelligent disinfection will only be carried out by a knowledge of the disease and organisms that are being dealt with, together with an understanding of certain fundamental facts in connection with the species of bacteria concerned. Thus Eugen Fröhner writes :—“ Anthrax, tetanus, and black-leg spores, tubercle bacilli, lung plague, and rabies virus require strong disinfectants ; whilst anthrax, swine erysipelas, glanders bacilli, foot-and-mouth, pox and rinderpest virus, require mild disinfectants.”

Veranus A. Moore in “ Infectious Diseases of Animals,” writes that : “ The failure resulting from the many efforts to disinfect stables, pens, kennels, and yards has caused much scepticism concerning the efficiency of many reported disinfectants.” Efficient disinfection depends upon a knowledge of the action of the chemical on the bacteria to be destroyed, on variability of resistance in the same species, the material in which the bacteria exist, the temperature under which the disinfecting agent acts. “ In many of the results the inhibiting action of the agent in question has been mistaken for its germicidal action.” Briefly, in practical disinfection the litter and the floors and walls are the chief objects of attention. The first should be burnt, the floors and walls thoroughly cleaned. Hot soda solution is recommended to thoroughly scrub the floors and walls—afterwards the germicide is applied. The disinfectant should soak to the bottom of cracks and crevices, and if a gas is used interstices must be cleaned to allow of its free access.

POISONOUS PLANTS.

By NELSON S. MAYO, D.V.S.

THE writer has been particularly interested for many years in the subject of the poisoning of live stock by various plants obtained in pastures. The losses of live stock from this cause in the United States are considerable, particularly upon the ranges of the Western States.

The spring season is unusually dangerous, as animals crave for

green food, and will eat plants that they will not touch under normal pasture conditions. Some plants appear to be poisonous only at certain stages of their growth that are inert or so distasteful that animals will not eat them at other periods of growth. The cockle burr (*Xanthium Canadense*) only causes the death of stock when it is sprouting and reaches the two-leaved stage.

The physical condition of the animals also seems to be an important factor. If they are thin in flesh and the digestive tract is empty, the toxic effects of plants eaten is pronounced marked.

In addition to the therapeutic suggestions for the treatment by Fred C. Mahon, M.R.C.V.S., in the February number of the VETERINARY JOURNAL, I would call attention to the value of potassium permanganate in weak solution. This has been used for some years with very satisfactory results by veterinarians in the United States.

The California Experiment Station, in a bulletin on "Stock Poisoning Plants in California," recommend a combination of potassium permanganate and aluminium sulphate. They say :

"PERMANGANATE OF POTASH AS AN ANTIDOTE.

"More valuable by far than any of the above-mentioned remedies is permanganate of potash. This chemical was especially recommended by Chestnut and Wilcox in their pioneer work on the stock-poisoning plants of Montana, and though more recent investigations indicate that it is not so effective as they then supposed, it is nevertheless a very valuable remedy, especially in cases where other and more specific antidotes are unknown.

"Permanganate of potash, through its strong oxidising action, attacks and breaks down most of the plant poisons. This oxidising action is accelerated when the substance to be treated is acid in reaction. The contents of the stomachs of animals are very often only slightly acid, or, in some cases, may be even alkaline. Because of this fact it has been found advantageous to administer with the permanganate some other chemical which will increase the acidity. Sulphate of aluminium is used for this purpose, since it is easily administered and is not so dangerous as the acids themselves. Permanganate of potash and sulphate of aluminium are quite inexpensive and are carried by all druggists.

"In practice, it has been found that best results are obtained when equal amounts of the two chemicals are used. The table below indicates the dosage for adult animals. For younger stock the amount should be somewhat reduced.

"PERMANGANATE OF POTASH.

" Sheep and hogs.	Horses.	Cattle.
" grs. 5 to 10.	grs. 15 to 20.	grs. 30 to 50.

"Equal amounts of sulphate of aluminium are added.

"The thoroughly pulverised chemicals are first dissolved in a pint to a quart of pure hot water, and, after cooling, the solution is administered as a drench. Great care must be exercised to ensure complete solution of the permanganate, since any undissolved in crystals may lodge in the mucous membrane of the mouth and throat and set up a serious irritation. The powder should be added to the water, the solution thoroughly stirred and allowed to settle for several minutes; the solution is then drawn off and any dregs which may remain in the bottom discarded. All organic matter, such as sugar, syrup, etc., must be kept out of the liquid, and the water used should not be strongly alkaline."

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS
ON ACTIVE SERVICE.*

By A. S. LEESE, M.R.C.V.S.

(Continued.)

IMPACTION OF THIRD AND FOURTH STOMACHS.

In camels, there is but little constriction between these two organs, and they practically form one long chamber; but the character of the mucous membrane clearly maps out their actual areas in the chamber. Camels differ from cattle in that the normal contents of the third stomach are semi-liquid or soft, and that that organ can be acted upon by mag. sulph. I think that impaction of the fourth stomach always precedes an impaction of the third stomach in camels; it could hardly be otherwise. The condition may be brought about by extreme thirst, and possibly also from dietetic causes. It is also characteristic of soamin or atoxyl poisoning, when camels are accidentally overdosed during treatment for trypanosomiasis. There is constipation, with small, hard, dark, dry cylindrical pellets of dung at first, and later no dung is passed at all. There is little or no appetite, and rumination soon ceases and may give place to vomiting. There are frequent spasms of pain, not violent as a rule; and a good deal of fidgetiness and moaning. Sometimes the impacted fourth stomach is perceptible by palpation behind the last rib on right side. If unrelieved, nervous symptoms follow; the camel is unable to co-ordinate his movements, and often falls when he tries to rise; and, later, he may be unable to rise. He may be three weeks in this condition before death takes place.

Treatment:—A dose of $2\frac{1}{2}$ or 3 lb. mag. sulph. in plenty of water, and followed by frequent administrations of water, cures most cases if given in time. Food should be withheld until the bowels have begun

* For previous instalments, see page 79 (March), page 136 (April), page 167 (May), and page 214 (June).

to act. Failing this, linseed oil 2 quarts, or eserine and pilocarpine (2 grains each subcutaneously) may be tried. Relapse must be guarded against by observing the state of the dung during the six days following relief; if the pellets again tend to become hard and cylindrical, another purge must be given; and if mag. sulph. is used $1\frac{1}{2}$ lb. will be enough, and the camel should receive rum, ammon. carb., or strychnine.

Diarrhœa and Gastro-enteritis may be set up by sudden changes of diet or grazing, mouldy fodder, or poisonous plants. Full justice cannot here be given to the consideration of the effects of grazing imported camels on certain plants which they have not been accustomed to; it is a common cause of indigestion and diarrhœa. Camels used to fresh water, and made to water from brackish wells, generally scour at first. Male camels when violently "musth" often have diarrhœa. Diarrhœa finishes off many camels exhausted by trypanosomiasis or by war conditions. The treatment for diarrhœa in camels is the same in principle and practice as in cattle. In all cases of diarrhœa, the tail should be tied to one side, for reasons which the novice will not take long to appreciate. Coccidiosis is supposed to have been seen in camels in East Africa, but this requires confirmation.

Abdominal Pain.—Colic is very rare in camels excepting when they are ration-fed. It is generally due to sudden changes of diet, or to sand. These cases are treated by purges and anodynes; mag. sulph. acts well in dietetic cases, but linseed oil and linseed tea are more suitable for "sand-colic." Chlorodyne, in $\frac{3}{4}$ to $1\frac{1}{2}$ oz. doses, relieves pain; chloral hydrate, if used, should be given in solution, because if a bolus of it is broken in the mouth, the palatal expansion may become violently inflamed. In sand-colic, an enema-pump is useful. I have seen several cases of recurring abdominal pain in camels; some had had daily attacks for weeks before I saw them; the peculiar fact remains that mag. sulph. cured all these cases at once and permanently. I do not know what this disease is. In camel-practice, peritonitis must be looked for in every case of abdominal pain.

Peritonitis.—This disease, in the camel, is one that arises apart from traumatism, and unexpectedly, a fact which the camel veterinary surgeon should know. I have already given my views on its causation, viz.:—the penetration to the peritoneal cavity of bacteria from the intestine via the mesenteric glands damaged and perforated by linguatula larvæ, which glands, in health, would otherwise act as safety valves against the bacteria. The disease chiefly occurs in the rainy season, at which time camels seem to have least resistance to bacterial invasions. The disease occurs quite independently from trypanosomiasis and is in no way connected with that condition. The peritonitis may be acute or chronic. Acute cases die in three or

four days ; violent continuous abdominal pain, high fever, tenesmus, and a characteristic respiratory movement, are the chief symptoms, generally enabling a correct diagnosis to be made at an early stage. The respiratory movement, which is diagnostic of this disease in camels, consists in a quick inspiration, a pause, and a quick expiration ; the pause is made to try and delay the pain caused by the contraction of the abdominal muscles in expiration ; respiration is as " thoracic " as is possible in this animal, and the belly is pendulous and not " tucked up."

Chronic peritonitis is one of the most horrible diseases imaginable ; for it results in the formation of new tissue about the spirally arranged colon in the left flank, which gradually presses on this gut and eventually closes it completely, and the animal dies of gangrene and rupture of the intestine immediately anterior to the stricture. The symptoms shown are similar to those of acute peritonitis, but fever is not so high, and there is a complete stoppage of the bowels except for the passage of a little dung of the appearance and consistency of vaseline. In this form of peritonitis the camel lives in perpetual agony for as long as fifteen days. If any doubt as to diagnosis exists, a rectal examination will reveal the tumefied mass formed by the new tissue around the colon in the left flank ; no one who has witnessed a camel suffering from this disease would refuse to take his coat off and make sure of the matter, so that the camel could be destroyed. There is no treatment for either form which does any good ; diagnosis is easy, and affected camels should be destroyed as early as possible. Of course, peritonitis may also occur from traumatism, as in other animals, particularly after castration ; I have seen it produced by pressure in a camel which died from enormous distention of the paunch with water taken after a long thirst ; and on *post mortems* it will sometimes be found to have arisen from a pleurisy via the diaphragm. But the two chief things to remember about peritonitis in camels are :—

1. It occurs in these animals without warning.
2. The respiratory action is diagnostic.

Hernia.—Small ventral herniæ are not uncommon in camels, but I have never seen one interfere either with work or with health.

"*Staggers*" is most suitably dealt with under diseases of the nervous system ; and *rheumatism* will be described when discussing lameness. Both these diseases of camels are of dietetic origin.

Liver-disease includes cirrhosis, hydatid disease and nodular disease ; none of these are important enough to worry a veterinary surgeon on active service.

DISEASES OF NERVOUS SYSTEM.

There are three characteristic camel-diseases which it is necessary to describe in detail under this heading, and they may be called

"Mad Staggers," "Cold-struck" and "Shivering," for the purposes of this article. But, of course, the camel suffers from certain other diseases involving marked disturbance of the nervous functions and which may be briefly dealt with first :—

Rabies and Tetanus have already been described.

Trypanosomiasis.—In this disease I have seen, more than once, an affected camel suddenly rise to his feet and rush out into the bush and fall dead. The blood swarmed with trypanosomes. This manifestation, however, is quite an uncommon one.

Cænurus cerebialis.—A case is on record, but I have no information on it.

Locomotor ataxia.—This is seen as a symptom in impaction of third and fourth stomachs and in Soamin poisoning.

Concussion of brain.—I have seen this as a result of a camel falling against a tree. Symptoms as in other animals; a purge was given and was followed by gradual recovery.

Apoplexy is the cause of death in most fatal cases of tympanitis in camels.

Satyriasis.—Occasionally camels may be met with which remain "musth" all the year round and are extremely vicious to man and beast. The excessive "rutting" amounts to mania in such cases. If they cannot be made tractable by castration, they are too dangerous to retain in military service.

Amaurosis will be dealt with under "Diseases of the Eye."

The three characteristic nervous diseases of the camel will now be described :—

"*Mad Staggers*."—This is a dietetic disease and the pathological condition appears to be an acute congestion of the meninges. I have only seen it in grain-fed camels. It is rarely met with when actually travelling with camels, but generally on a day's halt. The best conditioned camels are the chief sufferers; and the circumstance which is most liable to bring the disease on is a big feed of grain on an empty stomach (*i.e.*, after an enforced fast). Greedy camels which bolt their grain-ration and then start on their neighbours', are particularly prone to this disease. At first, the camel is unusually alert, restless, and noisy; in a short time, he will appear to go "mad," will break away from his picket and dash about aimlessly all over the place. In this state, a camel may rush right through a thorn zariba, or collide with trees, other camels, etc. The eyes are amaurotic, and all the animal's actions are plainly purposeless (differing from violent rabies). Some cases may break away into the bush at top speed and get lost; they may be found dead owing to falls or collisions, or may be discovered next day quietly grazing and recovered. Some camels which

fall to the ground early in the attack will struggle on the ground as though in an epileptic fit

Treatment consists in early purgation whilst the camel is in the alert, bellowing stage ; afterwards it is difficult to administer a purge without danger of choking ; indeed, you have to catch your camel first. Hypodermic purges are not very suitable, but may be tried at a pinch. The best purge, when it can be given, is mag. sulph., and the dose must be large to act on the bowels in this disease ; 3 lb. is necessary. The camel may also be bled from the jugular to the extent of 1 gallon. The vein is easily raised by pressing the fingers upwards on the under surface of the neck to one side and about 4 inches below the larynx. Further treatment consists in preventing the animal from injuring himself and in applying cold water over the cranium. With early treatment most cases recover and are subsequently little the worse ; but if the purge cannot be given quickly, many die, first becoming comatose.

Potassium bromide, 1 oz., or chloral hydrate, 1 oz., may be used in this disease, but the difficulty is to administer the drugs, owing to the state of the patient. Chloral hydrate should always be given in solution to camels and never in bolus.

"*Cold-struck*."—I do not pretend that this is a good name for the disease about to be described, except that it indicates the sudden onset, and the popular opinion as to its cause, viz., exposure to cold winds. I have had a lot of these cases in my time, and have made it a rule to investigate the history of the camel in every case ; and have come to certain conclusions, which, however, are very far from being a solution of the precise cause. These conclusions are :—

(i) Although the disease occurs in all sorts of camels, it is more common in riding-camels.

(ii) Cases occur at work, at rest, going down to water, after watering, in grain-fed camels and in those only living by grazing, in hot weather, in cold weather, in windy weather, and in the stifling calm of the hold of a ship at anchor near the Equator, in fat camels, and in thin camels.

(iii) Cases occur in camels quite free from trypanosomiasis as well as in camels with that disease.

(iv) The symptoms, sudden onset and course, seem to me to point to some local circulatory disturbance in the spinal cord not far from the medulla, and I suggest embolism.

(v) The disease is met with in all countries to which the one-humped camel is native. The disease has a sudden onset. The first symptoms may be nervous twitchings or jerky swayings of the neck, and partial paralysis of either a fore-limb or sometimes of both hind-limbs. But the paralysis quickly tends to become more general, and a typical

advanced case will be found sitting and unable to rise, and with a curious bulge of the neck towards one side. This bulge is seen in any disease in which there is great loss of power in the neck-muscles (thus, in approaching death, from any cause); but is particularly noticeable in "cold-struck," and people love to call it "wry-neck." The reason there is a bulge of the cervical vertebræ to one side is simply that the ligamentum nuchæ, which, in these cases, is practically the sole support of the head, is shorter than the column of bones, so that the latter sags to one side. Fatal cases die in coma. There is, in some cases, fever; in others, none. The camel does not look bad "about the head," and may take an interest in food until the muscular paralysis is advanced. Treatment is very efficacious if begun early. It consists in a preliminary large dose of Epsom salts (3 lb.); subsequently, administration of 4 oz. whisky or rum every 2 hours; keeping the body warm with blankets or jhools, and wrapping blankets around the neck for the same purpose; and preventing the camel from rolling over on to his side, in which position he sometimes gets his neck twisted under him and may suffocate. When the paralysis is complete except in the facial muscles, there is little chance of recovery; if the camel is to get the chance, his head must be supported on sandbags, or it will fall to one side. With early purging, camels often recover completely; the recovery is gradual and averages twelve days. There is, however, a good deal of loss of flesh to make up.

"*Shivering*."—This disease closely resembles equine "Shivering" in some respects; it is more common in Indian camels than others, and here again I have noted a special tendency for riding-camels to suffer from it. It is of slow onset, and the chief symptom is a violent tremor of the muscles of quarters and buttocks when in the act of "barracking" or sitting. After a time, the hind-quarters show a definite weakness in addition to the "trembling," and, at a still later stage, the quarters and buttocks atrophy. There is no difficulty in progression; but the camel becomes unable either to rise or to barrack properly under a load, and towards the end cannot rise at all. This is a gradual disease which takes months, and even years, to develop itself. As in horses, "shivers" improve temporarily with rest and good feeding, but there is no real treatment. The disease occurs in camels free of trypanosomiasis; but that disease seems to predispose to it. Its cause is wrapped in mystery. The trembling in the muscles of young camels not fully trained must not be mistaken for "shivering."

DISEASES OF URINO-GENITAL SYSTEM IN MALE CAMELS.

I have no information to impart on kidney-disease, bladder trouble, or calculi; excepting that I can assert with confidence that they are of rare occurrence in camels.

Hæmaturia.—I have seen this from ecchymoses in camels far gone in trypanosomiasis; and have notes at home of several other cases, of which some recovered and some died, but few opportunities occurred for real investigation. I have suspected oxaluria as one cause. *Hæmaturia* has been noted by Cross in a camel with a tuberculous kidney.

Pigmented Urine.—Is of no consequence and is sometimes seen in camels eating mango leaves, or after receiving turmeric. The inside of the hind-legs is then found covered with yellow pigment from the urine.

Paraphymosis.—Treatment as for other animals.

Orchitis.—Camels which "do the splits" on slippery ground may come right down on their testicles without dislocating their hips, and orchitis results, also sometimes sprain of the adductors of the thighs. Recovery is the rule from both these injuries. Sometimes the skin of the scrotum sloughs and exposes the tunica vaginalis; castration may then be necessary, of one or both testicles. The scrotum is a common object of attack by musth camels. Here again, if the teeth puncture the tunica vaginalis, the testicle should be removed as soon as possible. The cord may be found so swollen and division of it has to be done so high, that an ecraseur or ligature is necessary before one can get on to healthy cord. A suspensory bandage is useful in all forms of orchitis in camels.

Chronic enlargement of testicle has been noted in Egypt by Mason, associated with *Filariasis*.

"*Scirrhus cord*" in camels has not the appearance of a botriomycosis infection. Veterinary surgeons should know that the camel's penis has an S-curve, as in the ox; that the glans has a peculiar structure nearer that of the ram than of any other species; and that the urethral opening is too small to admit anything larger in calibre than a knitting-needle.

(To be continued.)

Abstract.

CURIOSITIES OF THE SLAUGHTER-HOUSE.

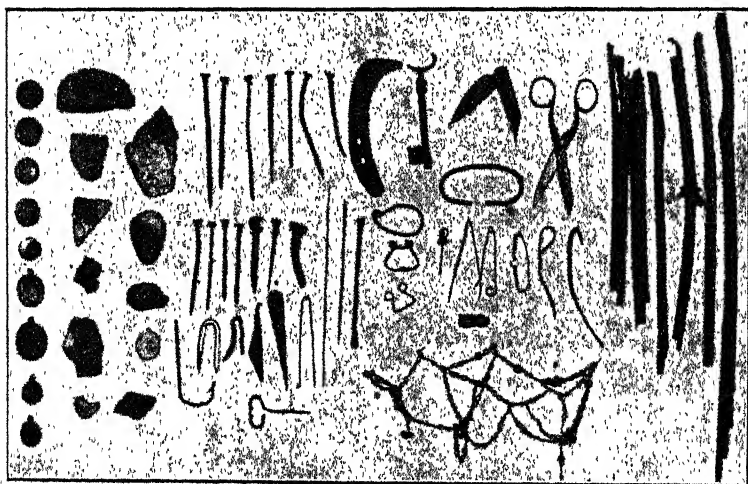
By E. TRULL,

Municipal Veterinary Surgeon, Barcelona.

E. TRULL has come across a curious collection of objects in different organs of the thoracic and abdominal cavities of cattle. He supplies a photograph of these, which we reproduce. Without exception, the foreign bodies piercing the heart and lungs have been pointed ones. They have been thrust forward by the contractions of

the stomachs, perforated the walls, crossed through the diaphragm, terminating their progress in the lungs, pericardium, or substance of the myocardium. In a certain number of cases they produced inflammation or abscesses at the spot of major or minor importance, according to the condition of the object.

Among the pointed objects may be recognised nails of various classes, fish-hooks, tie pins, needles for sewing pack saddles and leather work, scissors, parts of horse-shoes, forked sticks, etc., etc. Blunt objects remain in the stomachs, for preference the reticulum; whilst those of small size, and any pointed ones, pass into the rumen. Figuring in the second classification were money, medals, stones, rags, remains of shoes, part of a cane, and a sufficiently large portion of a rosary.



Objects swallowed by Cattle.

Some of these objects have no doubt found their way into the condiments given to the cattle and others have been overlooked because no great care or cleanliness has been exercised over the food given. Their presence occasions ailments difficult to diagnose, on account of the vagueness of the symptoms. Few would suppose that a head of cattle could fall ill by the lodging in their organs of any of the many objects previously mentioned.—*Revista Veterinaria de Espana.*
G.M.

Reviews.

ANNUAL REPORT OF THE CAMEL SPECIALIST FOR THE YEAR 1915-1916. Printed by the Superintendent, Government Printing, Punjab, Lahore. Price 3d. Obtainable from Messrs. Constable and Co., Orange Street, Leicester Square, and H. S. King & Co., Cornhill.

This is a very valuable and interesting report made by Mr. H. E. Cross, M.R.C.V.S., D.V.H., A.Sc., Camel Specialist. Mr. Cross has unique opportunities for studying the hygiene and diseases of camels. These are becoming more and more of vital importance as transport and troop animals, and their economic value to the countries in which they are indigenous necessitates a close study of their habits and ailments. The veterinary surgeon who is appointed to take charge of camels has none too many sources of knowledge to go to in order to obtain information concerning them.

A summary of mortality returns in the various camel corps is given, but as it is compiled largely from the reports furnished by camelmen, too much reliance cannot be placed on it.

The chief disease occurring was surra, 1,593 cases being diagnosed; whilst the total losses from death in eight camel corps were 2,500, or 22.7 per cent. Mr. Cross writes: "I have been unable to obtain evidence to substantiate the statement, made by many people, that the camel is a delicate animal; on the contrary, in my opinion, he is a very hardy animal, if worked in the climate he is accustomed to, and properly fed."

Surra is spread among camels by blood-sucking flies, and many anti-fly emulsion experiments were made. The results obtained by smearing with castor-oil were the most encouraging; but the expense incurred in the procedure make the smear of no practical value. Inoculation experiments indicated that the camel is susceptible to black-quarter, but trials made to determine its susceptibility to hæmorrhagic septicæmia were negative.

Missa, or moth bhusa, is used as a food for camels, and as green fodder, taramira-green, moth-green, and gram. To ascertain the amount of water they will drink they must be trained to take it from a bucket, and they must be allowed plenty of time, because they do not drink the whole lot straight away, but certain amounts at short intervals. The average amount of green food eaten when doing no work and receiving 6 lb. of gram is 66 lb.

The average amount of water when on green food, and doing no work, is 2½ gallons, and when on grain and missa bhusa, and working moderately, 5 gallons, and after exertion, 8 to 9½ gallons.

Sore throat was treated by 1 to 2 lb. of Epsom salts, fomentations to the throat, protection from sun, and green fodder.

Jhooling—a contagious disease of camels (characterised by the formation of local tumours, hot and painful, terminating in supuration and raw patches), is treated by excision, application of pure carbolic acid, blackwash, and Socins plaster, and placing the affected camel first or last in the string of camels according as the lesions are in the neck or hind quarters. Isolation of first case is

recommended and in examining camels for soundness none should be bought if small, hard, white spots (healed-up jhooling lesions) are observed on the skin.

Articular rheumatism is frequent in camels, muscular rheumatism absent or rare,

Wail is a disease characterised by loss of control of the hind quarters and difficulty in sitting down and getting up, whilst in walking the hind quarters sway from side to side. Grazing continually on lana, and shackling of the fore-legs of female camels, among which the disease chiefly occurs, are considered to be contributory causes of the ailment.

Two ounces of butter were obtained from 3 lb. of camel's milk after four hours' churning.

Outbreaks of disease among military camels were investigated at the request of the army authorities. Captain Ware, Officer in Charge of the Supply and Transport, Derajat Brigade, adopted the specialist's recommended treatment for surra, and cured 129 camels out of 158 treated. The drugs used were arsenic alone, and arsenic and soamin. It is stated by some camelmen that camels never recover from surra, but others asseverate that they do, and eleven camels are now being observed to determine the point.

Ponies were susceptible to camel surra, pus in the sinuses and cerebral symptoms being noted. Old camels are not immune to surra. There was an outbreak of surra at a camp at Chakdara, and tabanidæ were swarming at this camp. The specialist observes that "before sending a camel corps to any district where tabanidæ are known to be prevalent, every effort should be made to ascertain that no surra exists in the corps. Five out of fourteen ponies at the Chakdara camp became affected with surra: (1) Ponies can contract surra from camels; (2) ponies should not be kept in contact with camels.

Some sudden deaths amongst the camels in the 57th Silladar Corps were attributed to anthrax, and in Bhera Tahsil to "mad" surra, or anthrax.

Considering the wide area covered (Mr. Cross travelled 5,704 miles by rail and 2,445 by road) in making investigation and research, and the lucidity of the report on many ailments of camels, the author may be congratulated on doing extremely valuable and important work for the Empire, and the Government of the Punjab may be considered fortunate in having so strenuous and capable an official as Mr. Cross. The Hon. C. A. H. Townsend, I.C.S., promises to put before the Deputy Commissioners a request by the specialist, that steps shall be taken to get the Tahsildars to send in reports of all sudden deaths among their charges, so that the cases may be investigated.

G. M.

THE RHODESIA AGRICULTURAL JOURNAL. Edited by the Director of Agriculture, assisted by the Staff of the Agricultural Department, October, 1916. Published bi-monthly. Printed by the Argus P. and P. Co., Ltd., Salisbury, Rhodesia. Price 5s. per annum.

This periodical is well illustrated and printed, and full of useful

matter for the progressive agriculturists of the colony. It contains articles on cattle feeding, new crops, immunity, fertilisers in relation to rain, farm experiments, oil seeds, cow shedding and vermin. There is a reproduction of the first part of the article on "Immunity," by Mr. L. E. W. Bevan, M.R.C.V.S., which is well worth reading. The abridged veterinary reports for July and August, by Mr. J. M. Sinclair, Chief Veterinary Surgeon, appear in the journal. From them we gather that all the imported animals passed the tuberculin and mallein tests. Five bulls from Great Britain were subjected to inoculation against plasmosis, and when adequate accommodation is provided it is hoped that all suitable imported bulls will be subjected to inoculation as a protection from the disease.

To the layman or veterinarian interested in agriculture in the Colonies, the value of majorda melons as food for stock will be appreciated. The article on "Cow Shedding" is very readable, being written by Mr. R. C. Simmons, who also discourses well on a "Beef Feeding Experiment," at the Government Experiment Farm, Gwebi. The crop of majorda melons illustrated as being grown at the Premier Estate, Umtali, looks a fine and plentiful one. They are used as succulent food for stock, and we can quite understand their value and palatability to the animals. To us here the following would seem a queer ration to apportion for the making of beef:—Crushed maize, veld hay, oat hay, Napier's fodder, teff hay, velvet bean hay, green maize stalks, majorda melons, ground nuts; and yet, in a short feeding period of five months on this ration, very good profits were made on two groups, each consisting of eight bullocks. In February of last year these bullocks were purchased at £7 5s. per head. We could do with some at this price here just now.—G. M.

PERSONAL.

ONE of our very distinguished French colleagues, Professor M. E. Leclainche, who is now acting as Inspector-General and Chief of the Sanitary Service at the French Ministry of Agriculture, has been elected as a Member of the Academy of Science, in the place of the late Professor Chaveau. This is an honour much appreciated, both by the individual to whom it is given, and by the members of the Veterinary profession in France.

The following honours have been awarded by our Allies to members of the profession.

The Cross of the Legion of Honour :

Brigadier-General J. Moore, C.B.

(Director-General of the Army Veterinary Service in France).

Serbian Order of the Crossed Swords :

Brigadier-General R. C. Butler, C.M.G.

Officier de l'Ordre de la Merite Agricole :

Major E. M. Percy, M.R.C.V.S.

Croix de Guerre :

Major P. Argyle, D.S.O.

To be Members of the Distinguished Service Order :

Col. Axe, Col. W. Pallen, Lt.-Col. Matson, Major Kirby, Major Argyle, Major Andrews, Major A. Spreuil, Capt. Pryor.

Military Cross :

Capt. W. Mitchell, Capt. J. H. Taylor, Capt. C. H. S. Townsend, Capt. J. H. Stewart.

Obituary.

CAPTAIN BERNARD POOLE, CANADIAN A.V.C.

BORN in England, the son of Major G. K. Poole, R.A.M.C., Capt. Poole was at one time a student in the Royal Veterinary College, London. He did not, however, complete his studies there, but went to Canada, where he graduated from Toronto and practised for ten or twelve years at Peterboro, Ontario, being appointed Veterinary Officer to the 3rd Canadian Dragoons (Militia). He was one of the Veterinary Inspectors in the Canadian Agricultural Department, and on the outbreak of war came to Europe with a Canadian Contingent as Veterinary Officer. Popular with his brother officers, the announcement of his death was received with much regret, and the Canadian Army Veterinary Corps has lost a very efficient officer. He was killed by a shell whilst on duty with his brigade, and was buried with full military honours in the cemetery adjoining the large town near which he was stationed at the time.

He leaves a widow, a daughter and a son, the latter at present serving in the Canadian Forces.

ERRATA.

IN Professor Linton's paper on "The Dietetic Value of Wheat Bran," in THE VETERINARY JOURNAL for June, the following misprints occur:—Page 192: 257,000,000 ft. tons should read 25,700,000 ft. lbs; 11,000,000 ft. tons should read 11,000,000 ft. lbs. and the two subsequent figures in the same paragraph should read ft. lbs.

THE VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING;
MAJOR IN THE ARMY VETERINARY CORPS.
HONORARY MEMBER OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.
CORRESPONDANT ÉTRANGER DE LA SOCIÉTÉ DE MÉDECINE VÉTÉRINAIRE DU
BRABANT (BELGIUM).

Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

AUGUST, 1917.

Editorials.

THE AMERICAN ARMY VETERINARY SERVICE.

IN our last issue we drew the attention of our readers to the fact that an attempt was being made to form an efficient Veterinary Service for the United States Army, and we expressed a hope that it would be done on lines which were sufficiently sensible to attract the best talent; at the same time pointing out the curious anomaly that it was placed under the direct control of the Medical Service. The idea seems so utterly incongruous that it really might almost be described as absurd were it not for its seriousness. The Services are so entirely separate in their respective spheres of action that such a course cannot but lead to disorder, or, at all events it will prevent the best results from being obtained.

To induce the best and most skilled men to "join up," a proper Veterinary Department *controlled entirely and exclusively by Veterinarians* is the first essential, and to commence with it in any other way is a grave error. It should be a Department on its own footing in the same way as the Medical, Ordnance, or any other, and be held responsible for its successful organisation and management to the higher authorities just in the same way as they are. There can be no question of its necessity in order to keep efficient any mounted Service and it is a Unit which, although comparatively small, is of as much importance to the efficiency of the whole Army as is any other part.

To have it started on a proper footing will mean infinitely less of mistakes and trouble in the future, and to have anyone other than a duly qualified Veterinarian as its administrative head is an error.

We Britishers are assured that our American colleagues will see eye to eye with us in this, and if they are fortunate enough to be allowed to profit by the errors which their Allies made when building up their respective Veterinary Departments they will save much loss pecuniarily and much dissatisfaction and heartburning in the future. We have a splendidly organised foe to deal with, and one against whom we must take no chances, and each Department, whether great or small, should consider its opportunities, and make the very best possible use of them to work in unison with the whole.

HORSE RACING.

It is gratifying to read that the Government have sanctioned forty days horse-racing per year. The total stoppage of the pastime was a short-sighted policy which hardly took into consideration the pre-eminence of this country in blood stock breeding, and the necessity of the thoroughbred in the production of half-bred stock and army remounts. Besides, France and Germany have carried on their horse-racing, and it is conceivable that a continuance of the sport will have a better effect on the spirit that makes good soldiers, than a repression which leaves existence dull and dismal to not a few, and prevents others from experiencing the joy of "one crowded hour of glorious life." The staying power and endurance of our army horses is largely a matter of blood. Blood will tell. There is only one trustworthy test of the real value of thoroughbreds; it is provided by the racecourse. The future efficiency of our army depends on keeping up the breed of thoroughbreds. Unless racing exists the profitable production of thoroughbreds, failing an efficient State subsidy, cannot go on. Horseflesh will be greatly depleted the world over after the war, and to conserve, increase, and develop our supply as far as possible is only patriotic, judicious, and wise. To deplete the stock at the present time is but foolish and suicidal action. It is not opportune to greatly injure the source and development of a fine national characteristic and industry that has existed among us in England, Ireland, and Scotland since 1750. The purchasers of Ard Patrick, Galtee More, Slieve Gallion, Minoru, Aboyeur, Orme, etc., knew the value of prime blood stock to their countries, and the desire to benefit his land was not absent from the mind of the French breeder who gave 37,500 guineas for Flying Fox. The production of the stud book, the interest shown by kings, dukes, and lords in horse-racing and the development of breeding, the heterogeneous assembly on a race-course, are all indications of how the sport has interested the classes and masses of the people.

The stoppage of racing means present and future national loss,

the throwing out of productivity, by gelding, of much valuable stock, the closing of breeding establishments, and the selling of horses at ruinous prices. All this indicates that the future supply of light horses will be in jeopardy. No man wishes to dam the onward sweep of an essential stream, but meddling and peddling with the springs that supply it, limit its usefulness and curtail its power to flow and do good.

G. M.

Original Communications.

LEPINAY'S TREATMENT OF MANGE OF THE HORSE BY SULPHUROUS ANHYDRIDE.

BY VETERINARY OFFICERS VIGEL AND CHOLLET (OF THE
FRENCH ARMY VETERINARY SERVICE).

THE ravages produced by mange and other cutaneous affections in our cavalry during the winter have caused us to enquire whether sulphurous anhydride gas could be substituted for the ointments and baths hitherto used in the treatment of these maladies, and whether we could not find a more simple method of action, and a more rapid cure.

This gas, known since ancient times by all chemists under the name of sulphurous anhydride, whatever be the procedure and apparatus employed for obtaining it, was discovered as a particular body by the German Libarius in the 15th century, and studied afterwards by Priestley, Berzelius, and Gay-Lussac. Its antiseptic and parasitic qualities, universally recognised, have been confirmed by experiences made as well in France as foreign countries by Calmette, Langlois, Faiure, Chainot, Stazzi, Borachetti, Naldane, etc., experiences which have already been related, and to which we shall not return.

Majors Bruce and Stanley Hodgson have used it with success in the treatment of human mange, and Veterinary Surgeon A. M. Lépinay in his own clinique obtained excellent results in the treatment of mange of the dog.

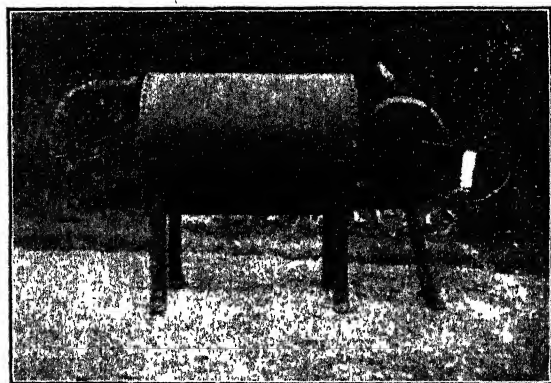
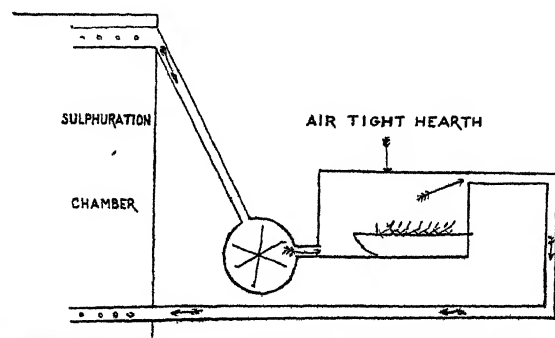
It is in view of the qualities of sulphurous gas, on the experiments made and the results obtained, that we have published our experience.

We claim originality for the procedure and its application in the treatment of mange of the horse. In our experiences we have utilised for the production of SO_2 , a commercial apparatus constructed for other purposes, but this apparatus was only a makeshift, and was by no means suitable to the treatment of skin ailments such as those we used it on. Since then we have had a

generator constructed which answers our requirements, and allows us to obtain the gas in the desired proportion. In a preceding report we have related our experiences. Our aim to-day is to explain the treatment in detail as we apply it.

Necessary Material.—The necessary material for treatment comprises two distinct things :—

1. The generator apparatus for SO_2 .
2. The sulphur gas chamber.



1. The generator is composed of three parts—
 - (a) An air-tight hearth in which a specially-shaped drawer contains the sulphur in combustion.
 - (b) A ventilator.
 - (c) Two pipes pierced with holes at regular distances and which run through the sulphur gas chamber in its whole length and at the top and bottom of the stalls. The one at the upper part of the hearth, communicates with the

ventilator, the other, for back draught, is at the lower part of the hearth.

Working of the Generator.—The air of the chamber is drawn up by the ventilator, and driven into the hearth over the sulphur, where it increases its combustion, and afterwards is drafted back charged with gas into the aforesaid chamber. The holes with which the aspirator and back draught pipes are furnished allow an equal diffusion of the gaseous mixture into the whole of the box.

The accompanying illustration shows the apparatus and its working.

2. The chamber of sulphuration should be air-tight, and of as small dimensions as possible. For our trials we have successively used a one-stall box, then a three-stall, and at present we apply the treatment with a ten-stall structure. This box is composed of ten similar stalls, side by side, separated by adjusted and perforated partitions. Their dimensions are the following: Height, 6 ft. 6 ins. at the anterior part, 5 ft. 5 ins., at the posterior part, 2 ft. 7 ins. wide, and 5 ft. 5 ins. long. These dimensions allow of employing only the quantity of gas absolutely necessary to obtain in the minimum of time the percentage desired of the gaseous mixture and to limit the defensive movements of the animals. At the posterior part the shutter windows allow of access of air. In the front of each stall there is a door in which is a window 2 ft. 7 ins. high, and 1 ft. 11 ins. wide, allowing passage for the horse's head. A cloth collarette fixed on the circumference of the window and drawn round the neck of the horse by means of a running cord protects the head of the horse from the action of the sulphurous gas. This collarette is fixed to a cloth collar with two pads which fill up the jugular furrows in such a way as to hinder all escape of gas at their level.

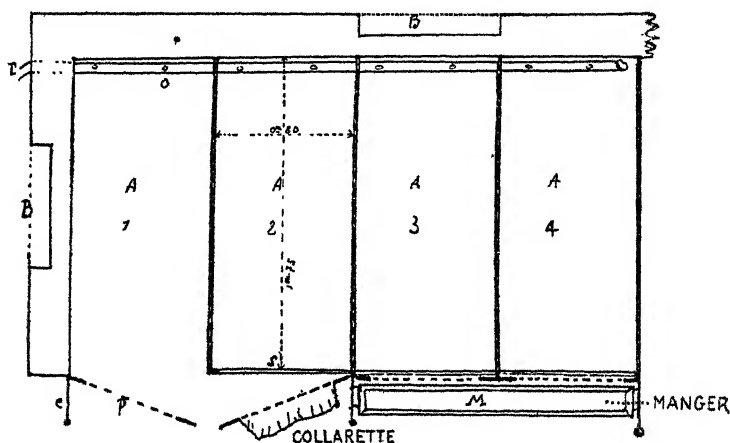
The photographs show the plan of the boxes.

Working of the Sulphur Chamber.—The doors are opened to the full extent, likewise the windows. The horse is backed into the stall. A safety bar is then put up at the level of the chest. This bar is movable and hinders the escape of the animal when the door is opened. The latter is then closed gently. The head of the horse is passed into the collarette, the collar put on, and the running cord drawn up. The head chains are fixed to a ring, and a little manger containing oats is placed before the animal. When all the horses are put in, the ventilation windows are closed.

Treatment then proceeds. When this is finished, the ventilation shutters are opened and the gas escapes. When it has nearly all disappeared, the collarette is loosened, the door is opened, and the safety bar lifted up. The animal then comes straight out without any difficulty, and does not inhale the sulphurous gas at any time.

Necessity of Using the Collarette.—The first idea was to shut up the horse completely, provided with a mask, in the sulphuration chamber. The concentration of the sulphurous gas, the duration of the operation, the necessity of watching the animal, were all against

Modified plan of the room for sulphuration in series. The doors are twin ones. The mangers are made for two stalls.



A.—Stalls: Width, 2 ft. 7 ins.; length, 5 ft. 5 ins.; height in front, 6 ft. 6 ins.; height behind, 5 ft. 5 ins.

B.—Window for ventilation.

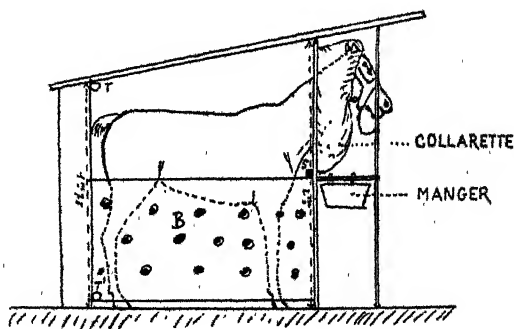
C.—Bars limiting the opening of the doors and serving as a support to the mangers M.

P.—Doors.

S.—Safety bar.

T.—Pipe (aspiration and return draught).

O.—Hole pierced in the pipe.



SECTION.

S.—Safety bar.

T.—Pipe for departure of gas.

T.—Pipe for arrival of gas.

B.—Fixed perforated partitions.

this. The plan of the cloth collarette gives us entire satisfaction. It is quite ample enough for the animal to move its head and neck freely. It is also cheap and can be easily replaced. The collarettes are cylindrical cloth tubes, 2 ft. 7 ins. long, and with a circumference of 6 ft. 1 in.

TREATMENT OF THE HEAD AND NECK.

As we have indicated, it was impossible to use a respiratory mask. But the collarette, which allows the animal to breathe the outside air beyond it, hinders the sulphurous anhydride from acting on the head and extremity of the neck. In order that these regions may be treated at the same time as the remainder of the body they are submitted, when the horse comes out of the chamber, to a vigorous dressing of cresylated oil 1 in 10, for preference with a hair brush.

In order to destroy the psoroptes existing in the external ear (as noted by M. Henry, Professor of Parasitology at the Veterinary School of Alfort) we introduce into the ears a recent and warm emulsion of 3 per cent. cresyl, at the same time working about the base of the ear. Horses submit very quietly to these simple and rapid manipulations. The treatment of the head and neck ought to be carried out with great care. As a matter of fact, the only relapses, and these quite benign, that we have seen are always produced in those regions not affected by the sulphurous gas, and have moreover easily yielded to a second application of cresylated oil.

TECHNIQUE FOR THE TREATMENT.

According to the results of our experiences and those obtained since, where we apply the treatment in series we have adopted the following technique:

1. Clipping of the horse.
2. Careful washing with a solution of carbonate of soda and of soft soap worked in with a stiff brush.
3. When the skin is thoroughly dry, generally on the morrow, place in the sulphurous fumes.

Each series of ten horses remains submitted two hours to the action of the sulphurous anhydride. Our generator apparatus allows us to rapidly attain a concentration of $5\frac{1}{2}$ to 6 per cent. and the temperature in the interior of the structure may rise up to 30 degs. C. (86 degs. F.) The percentage and this temperature have only some advantages, for one knows the more one or other are raised, without over-reaching 32 degs. C. (90 degs. F.), the more effective the action of the gas is.

We have never had the least accident in 500 horses treated.

4. Care for the head, neck and ears indicated on coming out of the sulphur chamber.

5. Second washing three days after application.

REMARKS.

To obtain good results and not to render the method responsible for possible relapses it is necessary to take some of the following absolutely indispensable precautions:—

1. Immediately after the treatment provide the animals with carefully disinfected halters and tie-ups.

2. Put them in places equally carefully disinfected.

3. Ensure them a regular grooming which facilitates the elimination of epidermic debris and stimulates the function of the skin. This grooming may be very advantageously completed by some washings of the body.

4. Exercise rigid supervision in such a way that any animal capable of contaminating his companions may be immediately separated.

5. Carefully disinfect all stable utensils and harness.

If in spite of all these precautions a relapse occurs, a second course of treatment immediately applied suffices to overcome it.

This method of procedure has given us conclusive results. In fact at the present moment, of 500 horses treated, 200 have been evacuated (120 in one month). The others, from the point of view of health, are still unattached, either on account of poor condition or by reason of illness contracted at the Dépôt.

CONCLUSIONS.

The sum total of our experiences and the success obtained since we applied the treatment in series induces us to come to the following conclusions, which only confirm those put forth in our preceding report.

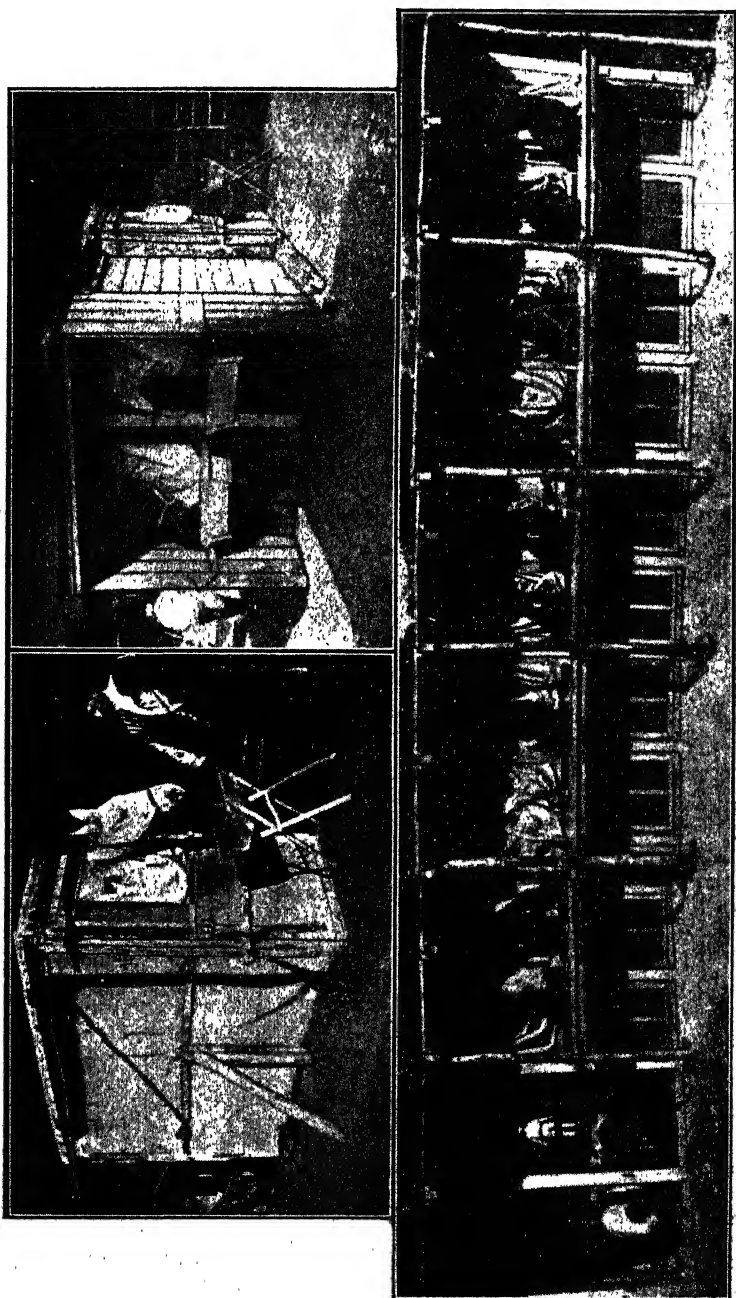
The treatment of mange of the horse by sulphurous anhydride is an effective, simple, inoffensive, rapid, and economic method.

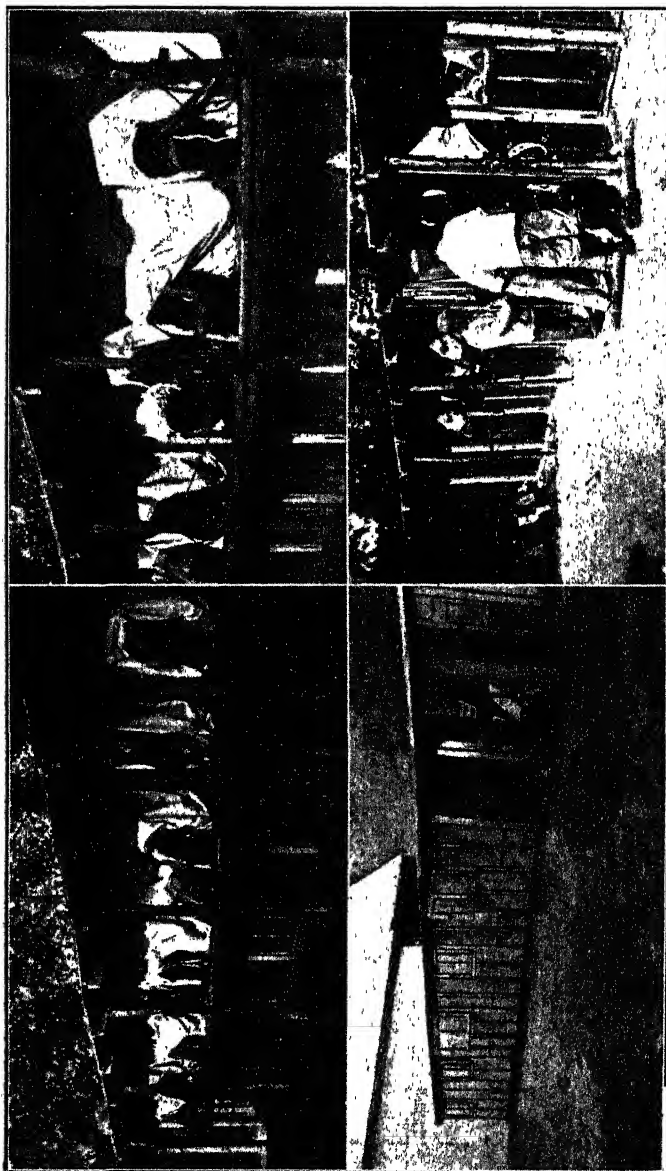
1. It is effective; as a fact at the end of a few days the specific clinical signs of mange have disappeared, the animal no longer rubs itself, and the skin returns to its normal state of good health.

2. It is simple. No specialised personnel is necessary for the application of the treatment, whilst the horse is absolutely plunged into a bath of sulphurous gas.

3. It is inoffensive. No animals treated have been inconvenienced by sulphurous vapours.

4. It is rapid. The animals are only submitted to one application of two hours, and all care necessary for their cure, such as two washings





and sulphuration, can be given in the space of a week. More than this the actual sulphuration room allows us to submit forty horses a day for treatment. We thus obtain an important result.

5. It is economic from several points of view.
 - (a) Because it cures mange in the minimum time.
 - (b) Because it does not in any way prejudice the health of the animals, and allows them to quickly recover their condition, it lessens the time of their detention.
 - (c) Because all animals treated are cured.
 - (d) Because there is no need for fresh and expensive installation.
 - (e) Because the treatment of a horse at the market price of sulphur amounts to 75 centimes ($7\frac{1}{2}$ pence).

TREATMENT OF RINGWORM.

We have treated nine horses with ringworm in the same way as those with mange. The results have been absolutely satisfactory.

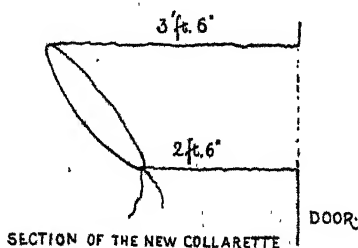
TREATMENT OF LICE.

Lice and nits are radically destroyed without any recurrence by a sulphuration of 25 minutes.

Prevention of Mange, Ringworm, and Lice.—Before their departure from the dépôt, as evacuated, all horses are submitted to the new treatment, which acts as a preventative against contamination which may have occurred unknown to us.

ADDENDUM.

An improvement to our technique has been devised in the use of the collarette since the issue of our report. A new plan simplifies the treatment of the head and neck regions. The collarette is drawn



up over the ears of the horse, *i.e.*, on to the forehead, above the eyes, on to the temples, under the throat. The neck, the parotid region, the ears and their interior, are in this way submitted to the action of the SO_2 , and only a part of the head remains to be treated with the cresylated oil. The halter, which is too thick to allow of drawing up of the collarette, is replaced by a strap. No escape of gas can irritate

The grains after being thoroughly cleaned are put to soak in vats containing a weak solution of sulphurous acid, which softens them and facilitates the separation of the husk and germ.

After complete maceration the grain is crushed and conveyed to tanks of water where the germ, now separated from the rest of the grain, floats to the surface on account of its oil-content and is removed. It is then rolled, dried, cooked, and subjected to hydraulic pressure, which removes most of the oil and leaves a residual cake known as *maize germ cake*, or if re-ground as *maize germ meal*. Contrary to what is the case with Indian meal milling, in starch works the de-germing of the grain is an important process. The germ must be removed in an entire state, and completely removed from the grain. It is a flotation process, and if any of the endosperm was attached to the germ the latter would not float. Therefore, the whole germ, and nothing but the germ, must be removed. When this pure germ is pressed to contain 10 per cent of oil, it leaves a cake or meal having a percentage composition as follows :—

Protein.	Fat.	Carbohydrate.	Crude Fibre.	Ash.
23%	10%	41%	4%	1.50

The efficiency of de-germing is the controlling factor of the protein content of germ cake and meal; hence the difference in the composition between the "Indian meal" germ cake and the "starch works" germ cake.

Reference to the chart of the starch works process will show that the crushed and de-germed corn is then ground, washed and sieved. The husk, and with it the vitamine layer of the endosperm, is separated from the starch, re-ground and again washed and sieved to remove any starch which may remain. The two lots of starch, which still contain the gluten, are mixed in water and conveyed as *starch liquor*, to long, slightly-inclined runs. The starch, being the heavier, settles, and the gluten is carried off with the water.

In addition to the maize germ cake, there are now two other residuals, the ground husks or bran, and the gluten. According to individual manufacturer's inclination these two residuals are either dried and put on the market as separate commodities, *maize bran* and *gluten meal*, or the two are mixed while still wet and the mixture filtered, the residue being ground and dried and sold as *maize gluten feed*.

Pure gluten meal is a heavy meal containing about 35 per cent. of crude protein. If the bran and such grits as may be adherent are mixed with it, a more suitable food-stuff, and one which is more easily eaten, is produced. It is now seldom that the meal and bran are sold separately.

The percentage composition of maize and some of its products are as follows :—

			Crude		Carbo-			
			Water.	Protein.	Fat.	hydrate.	Fibre.	Ash.
Maize	..	..	11	10	5	70	2	1.5
Bran	..	..	9	9	6	62	13	1
Germ meal (I.M.)	..		11	13	12	56	4	4.0
Germ meal (S.W.)	..		11	23	10	41	4	1.5
Gluten meal	..		10	35	4	45	2	.8
Gluten feed	..		10	24	4	56	5	1.1

Maize and its products are well digested by both oxen and horses, but the latter make less use of the fat than do cattle. Since the composition of maize by-products varies according to the method and completeness of the starch extraction, the starch equivalents and nitrogenous ratios here given can only be regarded as approximations sufficiently near for practical application. The same set of figures will do equally well for horses and oxen.

Starch Equivalent.

Foodstuff.	Maintenance.	Production.	N. Ratio.
Whole Maize ..	82	80	1:9.5
Germ meal (I.M.) ..	85	79	1:8
Germ meal (S.W.) ..	85	77	1:3
Gluten meal ..	85	76	1:1.5
Gluten feed ..	85	77	1:3

It will be seen that though maize and the above by-products are practically isodynamic, they are divisible into two distinct classes; those having a medium nitrogenous ratio of 1:8 or 1:9, including whole maize and the Indian meal miller's germ meal, and a second class with a narrow nitrogenous ratio of 1:2 or 1:3, which includes maize gluten meal, gluten feed, and the starch works germ meal.

The use of maize as a concentrate for horses is strongly advocated by some horse-keepers and veterinary practitioners, and no less emphatically condemned by others.

Neither whole maize nor any of its products can be regarded as a complete food. Being deficient in mineral matter and lacking some essential amino acids, maize fails to procure growth or even to sustain life if it forms the sole diet. The eating of sound maize by people does not cause any untoward result, but damaged grain, that which has got damp, is held to be responsible for pellagra, a condition which is analogous to ptomaine poisoning. The bad effects which follow the feeding of damaged cereals to horses are well known, the most prominent symptoms being profuse polyuria and rapid emaciation.

There is sufficient proof that sound, whole maize can quite well

form the bulk of the concentrate ration of mature working horses, provided that it is fed intelligently. The feeding of even sound maize to horses is often blamed for causing an eczematous eruption, and undoubtedly it sometimes does ; but it is well known that if the grain be given in small quantities to begin with, and is then given in regularly increasing amount, and not intermittently, either no bad effects are noticed, or they are of a transient nature. Where undesirable effects are pronounced it is invariably to be found that the feeding has been either injudicious or that the supply has been irregular.

The alcohol soluble protein *zein*, on hydrolysis, yields neither glycine, lysine, nor tryptophane, and the injurious effects sometimes caused by the feeding of sound maize has been attributed to the absence of this latter amino acid.

It has also been held to be due to an excess of phenyl-alanine and tyrosine, which readily split off phenylic compounds and so produce phenol poisoning. It is highly improbable that the bad effects which do sometimes follow an incautious use of whole maize are due to a lack of any essential amino acid. The symptoms are not those which result from nutritional deficiency, and, furthermore, with constant and regular feeding of the grain, the bad effects cease to be apparent. The reverse would be the case if the absence of one or more essential amino acid was responsible. Mr. W. Acton, M.C.S., chemist to Messrs. Wm. Mackean, Ltd., starch manufacturers, Paisley, suggests that the hurtful property is located in the soluble albuminoids of the corn which are present to the extent of 0.7 per cent. in the whole grain. These so-called soluble albuminoids are partly albuminoids in course of formation, and are nearly allied to the amino acids to which they are easily degraded by hydrolysis.

Most ptomaines are derived from the amino compounds, and Mr. Acton is of the opinion that there is a possibility that the smaller an albuminoid molecule is the more liable it is to be absorbed into the system, and if absorbed in sufficient quantity, and before the body has had time to prepare its defences, injurious effects result. The view that the eczematous eruption is in some way connected with the "corn solubles" is upheld by the fact that no bad results have so far been noticed after the feeding of maize products from which the solubles have been removed by the leaching which is necessary for the complete separation of the starch from the other constituents of the grain. In some factories the wash water is evaporated and the residue added to the by-products. This increases the ash content, and is said to raise the nutritive value of the food, but it would appear to be of doubtful utility, and unless the acid residue is neutralised with an alkali, the gluten feed would be too acid to be palatable.

During the last few months maize gluten feed has figured in the rations suggested for horses in the *Journal of the Board of Agriculture*. As this food has been but little used as a concentrate for horses, and as there is, therefore, but little known as to its suitability for this purpose, the writer, at the cordial invitation of Messrs. Wm. Mackean, Ltd., visited their works in order to obtain an insight into the manufacture of this product with the idea of testing it on horses, and he is greatly indebted to this firm for the kind courtesy shown him, and for the material supplied for the feeding trials.

Gluten feed, when produced and marketed as described, is a rather coarse and heavy meal—that is, in comparison with other meals. It was at once apparent that ordinary gluten feed is not suitable for the feeding of horses when their concentrates are mixed with cut straw or cut hay, and especially if the food is mixed in bulk for a large number of animals. The feed on account of the small size and weight of the pieces settles out, and a thorough mixture is not maintained. For the same reason it falls to the bottom of a nose-bag and is not readily picked up and eaten. With the ordinary rough wooden mangers found in many commercial stables horses have great difficulty in eating this class of food and consequently there is considerable waste.

At the writer's suggestion, Messrs. Mackean kindly supplied a quantity of the feed which was bagged after drying. This gave a much more suitable material, but still it was not in large enough pieces to be eaten without waste. Trial with hacks and harness horses fed from iron mangers, and with the gluten feed mixed with oats without the addition of chaff, showed that it could be eaten up clean, but that it was not coarse enough for the ordinary feeding of commercial horses.

A further suggestion brought out a much coarser product which satisfactorily solves the physical difficulties of the ordinary gluten feed. Horses show a distinct liking for this food, and will eat it readily from the hand, and do not refuse it when mixed with oats or other cereals. Throughout the trials there was no evidence that it became pasty in the mouth when mixed with saliva.

Maize gluten feed contains digestible nutrients in much the same proportion as field beans, both contain about 19 per cent. of digestible protein. The gluten feed is therefore a concentrate which can be used to increase the amount of available protein in the ration of working horses, and it is probable that it can replace the legumes for this purpose when the latter are difficult to obtain or are too expensive. It is a nitrogenous concentrate which deserves a more extended use among horses-keepers, not only on account of its nutritive value, but because of its comparatively low cost.

Maize germ cake is also palatable to horses, though some may not freely eat it for the first day or two. The writer suggested its use to a farmer whose horses were falling off in condition during the hard season. The beneficial result from including more nitrogenous food in the ration during the hard-working period soon made itself apparent.

REMARKS ON SAND COLIC AS MET WITH IN EGYPT.

By MAJOR G. McINTYRE, A.V.C. (T.F.).

Sand may be present in the bowels in small quantities without producing any appreciable symptoms. As it accumulates, however, it begins to cause serious derangement. The first sign of trouble is frequent attacks of diarrhoea and falling off in condition. The diarrhoea is particularly noticeable after the horse has been at work. These symptoms, I think, are due to the irritation of the mucous membrane of the bowels by the sand. This irritation causes the bowels to evacuate their contents before they are properly digested.

The first actual symptoms shown may be very slight—simply a general uneasiness. The animal may continue feeding, but will break off frequently, appearing dull and hanging its head. The subject may show these symptoms at frequent intervals for some time before having an attack that will present colicky pains. When such an attack does occur, the symptoms exhibited differ from those in colic due to other causes by not being so violent. The animal is markedly uneasy, lying down and getting up frequently. It goes down very steadily, and when down the favourite position is on the side. Violent efforts to roll are seldom present, though there may be attempts to get on the back. In severe cases considerable difficulty is experienced in inducing the animal to get up, particularly if he is lying on a comfortable soft place.

The membrana nictitans, breathing and pulse are only abnormal in very severe cases, and then these symptoms do not differ from those found with "twist of the bowels." A certain amount of flatulence may be present, depending largely on the nature of the subject's food.

I consider the preference of the animal to lie on the side and the peculiar disinclination to rise to be almost diagnostic of sand colic.

Pathology.

All *post mortem* examinations of the bodies of animals that have died from sand colic show practically the same conditions. An accumulation of sand is found at the pelvic flexure of the large colon. The mucous membrane of the bowel is inflamed and the blood vessels

engorged. The bowl anterior to the accumulation of sand may be full of semi-fluid material, but posterior to the obstruction it is generally quite empty.

In about 20 per cent. of cases the large colon is found to have taken a half turn on itself. I have found the mucous membrane of the colon very inflamed, and presenting quite a dark red appearance. There was a sub-mucous gelatinous exudate which gave the bowel a very thickened appearance.

Method of Introduction.

Sand is introduced into the digestive canal by various means. The most important of these is by the horse deliberately eating the sand. When stables or lines have a sandy floor it is quite common to see the horse licking and eating the sand during idle moments between feeds. This can be largely prevented by feeding six or seven times a day instead of the usual four times.

When grain or broken pieces of hay lie about on the ground the horse tries to pick them up. In doing so he gathers sand as well. Dirty feed conveys sand to the bowels. The fodder that offends most in this way is sucrapaille, as the sand sticks to it easily. Tibben carries a lot of sand and grit. This is largely due to its preparation.

Sand accumulates in nosebags if they are not properly cleaned and dried after feeding. Nosebags should be turned outside in after feeding and laid out to dry, as moisture from the breath of the horse condenses in them while he is feeding. When dry, they must be well shaken and turned proper side out.

Preventive Measures.

Careful horse-management is the greatest preventive of sand colic. The points to consider principally are :

- (1) The best method of feeding the animal.
- (2) The study of the horse's habits.
- (3) Determining whether the sand is salty or not.

Everybody in charge of horses ought to have a general idea of the anatomy and physiology of the animal's digestive tract. Owing to the small size of its stomach and the rapidity with which food leaves it, the horse may be said to be always hungry. Within an hour of finishing a feed he is looking round for more. Thus, if he is fed three, or at most four, times a day, as is usual, there are long spells in which he will nibble at anything within his reach and try to pick up bits of food from the ground.

(1) The best method of feeding the horse is by giving small quantities at frequent intervals. On service in the field the nosebag is found to be too small to hold the day's rations in even four feeds. The procedure I advise is as follows :—

- (a) The hay or dries should be chopped.
- (b) All the grain issued should be mixed and divided between four feeds.
- (c) With each feed of grain put tibben or chopped hay about $1\frac{1}{2}$ lb.
- (d) The remaining "chop" to be divided into three feeds, and given in intervals between the grain feeds.

In this way the horse is always fed just about the time when he begins to get restless.

I found that by adopting this method of frequent feeds, sand muzzles were not required, and were finally discontinued.

(2) A study of the horse's habits is always instructive. He may bolt his food or be a very slow eater. He may be a wind-sucker and crib-biter. There may be a bully or two amongst them, and when animals are fed out of mangers, these generally upset the others and should be removed to a place by themselves or fastened at the end of the line.

(3) If the sand is salty there is much more danger of the horses licking it, as they like salt. To try and obviate this, I gave them plenty of salt in their food. I found that the salt out of the bacon boxes was not used, so collected it and gave it to the horses with excellent results. I observed that giving $\frac{1}{2}$ lb. of boiled linseed weekly decreased the number of cases of colic.

Treatment.

I have had most success with ammonium carbonate followed by a drench of linseed oil and turpentine. I give two 4-drachm ammonium carbonate balls when first called to the case. If these do not relieve it, I continue giving one ball every three-quarters of an hour, and give the oil drench after the second dose of ammonium carbonate.

The reason I do not give the drench at first is that, if possible, I prefer to give it when the horse is normal, and in most of the cases that I have attended the first dose of ammonium carbonate has been all that was required. After an attack of sand colic I always physicked the horse. If linseed oil was not available, an ordinary 4-drachm physic ball was given. I prefer linseed oil, as it is more soothing to the bowel and more certain in clearing out the sand.

I do not believe in the use of sedatives, except in very severe cases, where it is necessary to prevent the animal from injuring itself too much. For this purpose I use chloral hydrate, 1 oz.

Hypodermic injections of arecoline and eserine I consider dangerous and do not advise their use.

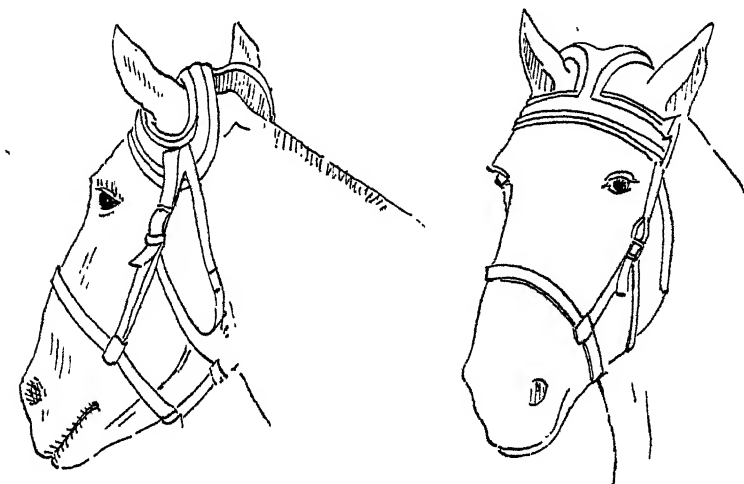
A POLL EVIL BRIDLE.

By MAJOR J. R. HODGKINS, F.R.C.V.S.

Army Veterinary Corps.

WHEN an animal is recovering from an operation for poll evil, it seems a pity that its services should be entirely lost because of the need of an apparatus which can be used as a bridle, and yet do no injury to the healing wound.

Such an apparatus has been devised and is used constantly in this hospital. I attach a sketch of it.



It consists of a light iron framework, which passes across the brow and rests on the supra orbital processes and encircles each ear. The ironwork is leather-covered and is stitched on to felt which corresponds in shape, but is larger than the framework. The cheek pieces and throat lash are attached to the framework at a point below the base of the ears. The portions of the framework encircling the ears are bent forward in such a manner as to entirely dispense with any pressure in the region of the poll.

DISINFECTION OF STANDINGS.

By MAJOR J. R. HODGKINS, F.R.C.V.S.

Army Veterinary Corps.

TAR is a splendid application for the woodwork and ironwork of a standing, as a complement to other methods of disinfection. It has a serious drawback in the length of time it ordinarily takes to dry.

By the following method a standing can be tarred and rendered.

fit for occupation in half an hour. The usual methods for the removal of dirt in the way of scrubbing with hot water and antiseptic having been carried out, the standing is "lamped" out. This dries the wood, iron, and other work. The hot tar is then applied. The application having been completed, the disinfecter takes a small tin scraper in his left hand, and a brazing lamp in the other. He boils away the surplus tar with the lamp, scraping the surface up and down, until the wood or other material is perfectly dry. The flame which arises from the tar is easily controlled and put out by the scraper. Tar applied in this way "creosotes" the woodwork and preserves it.

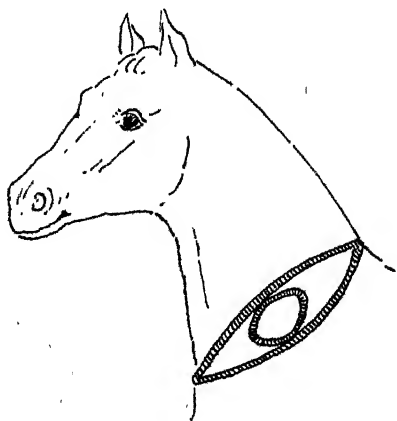
If a standing has already been tarred several times, it will be found that only at a few places will the tar need renewing. The application of the flame boils up the existing tar, which should be scraped up and down until a clean, dry surface remains.

TREATMENT OF SEROUS ABSCESES ON THE SIDE OF THE NECK AND SHOULDERS RESULTING FROM BITES.

By CAPTAIN A. R. ROUTLEDGE, F.D.C.V.S.

Army Veterinary Corps.

THIS lesion shows little or no tendency to absorption, and if lanced the cavity always suppurates and, though the sac shrinks, the discharge continues indefinitely. Cicatrisation causes a wrinkled



The method of incision in operating for serous abscess in the region of the neck. Note the direction of long axis of operation wound and long acute angles.

condition of the skin—always unsightly—if near the draught part of the shoulders it ruins a horse for harness work.

Method of Operation.—Excision, which can be carried out standing,

with or without a local anæsthetic. The tissues to be excised should be included in a long elliptical incision, the long axis being at right angles to the long axis of the neck. (See attached sketch.) The skin in the neck region is very loose, and if the incision is long and acute-angled the wound will draw in to a straight line.

The resulting operation wound may appear alarming—as much skin as 18 by 9 inches has been excised repeatedly in this hospital. The operator need have no fear, the wound invariably makes a good recovery without complication. Where a large portion of skin has been removed the average time for recovery is about two months.

TREATMENT OF GREASE.

By CAPTAIN A. R. ROUTLEDGE, F.R.C.V.S.,

Army Veterinary Corps.

THE use of the actual cautery is by no means novel, but the success attending its judicious application appears to be little understood or taken advantage of these days. In this hospital gratifying results have been attained, especially in the “grape” variety of grease, when the following procedure has been carried out.

The patient having been cast, chloroformed, and the limb suitably fixed, the hair is clipped off short, and the seat of operation washed and cleansed, and the tourniquet applied. With a sharp small scalpel, shave the “grapes” or verrucose tissue, until the epidermis is reached.

A red-hot flat firing iron of the ordinary pattern is then rubbed over the surface, when it will be noticed that one gets exactly the same re-action as in searing a cankered foot. The diseased tissue fizzes up like toasted cheese. If the application of the iron is continued the tissues become chrome leather-like in appearance, then yellow and brown. When the brown stage is reached it is most important to stop further cauterisation, otherwise sound tissue will be damaged, prolonging the healing process. Continue till all the diseased area has been dealt with. In the case of rugæ or folds, it is best to shave them off, and apply the hot iron in the same way.

Thoroughly anoint the operation area with zinc ointment, which is left on for three days, after which period it is removed and a fresh dressing applied. Between seven and ten days after operation an eschar or slough will separate and peel off. Treat as an ordinary wound as the conditions indicate—powdered alum is very useful. Recovery takes place in three to four weeks. If the operator has carefully and thoroughly done his work there is no tendency to recurrence.

ANTHRAX: A PECULIAR CASE.

BY CAPTAIN J. MALCOLM ARMFIELD, A.V.C.

Several months ago I was called to give an opinion on the cause of death of a native-bred ox, being informed that foul play was suspected. The natives in this district stab cattle up the rectum with assegais, hoping to get the carcase for food. (Similarly they sometimes pierce pigs through the heart with hat pins—but this is another story.)

As the carcase was in good condition and the death sudden, I took a blood smear from the ear and examined microscopically for anthrax bacilli. Finding none, I opened the carcase, but could find no trace of a spear injury in the bowel, although I searched carefully, and the spleen was normal in every respect. Being puzzled, I took a piece of the ear home, made another slide, this time finding typical anthrax bacilli. I explain the different results of the two smears as follows:—

The first one was stained by McFadyean's method, and, I presume, in endeavouring not to overfix the slide by heat, it was not fixed sufficiently; consequently, the bacilli disappeared in the subsequent washing.

The second slide (in which typical bacilli appeared) was stained by the usual methylene blue method, fixing with absolute alcohol.

I report the case as anthrax in cattle with a normal spleen is rare, and also to show the possibility of a mistake in carrying out McFadyean's method of staining.

TREATMENT OF ULCERATIVE CELLULITIS WITH PICRIC ACID.

By CAPTAIN T. G. S. BOGUE,
Army Veterinary Corps.

ULCERATIVE cellulitis has proved itself a very troublesome disease amongst horses in the Army. Although I have been in France since November, 1914, I did not come across a case of it until October, 1916.

The disease begins usually as a painful swelling, extending from the hock or knee, as the case may be, to the coronet; one limb, generally a hind, being first affected, though later on the infection may spread and involve another limb. A small, bulbous protuberance first appears on the swollen leg. This soon bursts, discharging blood-stained pus, and leaving an ulcer difficult to heal. The horse, which at the onset of the disease is generally very lame in the affected limb, exhibits great relief once the swelling bursts. Other bullæ may appear later and burst, leaving the limb a most unsightly object.

Heavy horses are more severely affected than the lighter breeds, and do not so readily respond to treatment.

Having tried all the treatments recommended, with little or no success, I experimented with a 1 per cent. aqueous solution of picric acid with most satisfactory results, it being used in the following way: Carefully clip the hair from the affected limb, and wash with soap and warm water to clean off all discharge. Dry with a soft cloth. Then soak a piece of gauze, folded in several layers and sufficiently large to cover the ulcers, in a 1 per cent. aqueous solution of picric acid; apply this to the limb, cover with dry cotton-wool, then a piece of jaconet, and bandage to keep the lot in position. Remove in twelve hours, wash away any discharge with warm water, then gently syringe out the ulcers with the solution of picric acid, and apply the gauze, cotton-wool, jaconet, and bandage as before. Continue this treatment twice daily for three days. On the fourth day the ulcers will be found to present a healthy appearance, the heat and swelling will be greatly diminished, and discharge will have practically ceased.

Further treatment consists in the application of the picric acid dressing, used twice daily, and dabbed on with a piece of cotton-wool; no further bandages are required, and in ordinary cases the horse will be fit for work in from ten to twelve days or so.

Horses under treatment should have gentle walking exercise, gradually increasing, but no hard work until the ulcers have dried up. My experience has invariably been that horses in the first phase of ulcerative cellulitis have the disease greatly aggravated if called upon to do a long march, or other hard work, as is sometimes, of course, unavoidable on Active Service.

I have had only one case so far of a horse, cured by the picric acid solution, having a relapse. This case was a mare (troop horse), cured for two months, but the disease had left her off hind leg a bit "gummy." As she was a show mare I thought I would try and get the leg to its normal size by applying a blister. This unfortunately brought on the ulcerative cellulitis again, ten days after the application of the blister; two ulcers appeared, but she quickly responded to treatment, and was discharged for duty in twelve days; the following day she came along with the regiment on a four days' march, and the leg is now finer than before I applied the blister, but in future I will be content to leave well alone.

It is of interest to note that as ulcerative cellulitis almost invariably occurs below the knee and hock (most frequently the latter), in my opinion a very likely source of infection is the urine, these parts being most exposed to contamination when the horse urinates,

especially when this is done on hard ground. Further investigation as to whether the micro-organism causing the disease exists in the urine is suggested, but this, of course, must be left in the hands of the expert bacteriologist, and if found to be correct, the exhibition of urinary antiseptics would no doubt be of great value.

UNUSUAL RESULT AFTER THE "ROARING" OPERATION.

By W. TAYLOR, M.R.C.V.S., D.V.H., I.C.V.D.,

Punjab Veterinary College, Lahore, India.

On February 1st the patient, a six-year-old waler gelding, was operated upon. When the incision through the membrane into the larynx was made, the left vocal cord was seen to be completely paralysed.

The usual operation of stripping the ventricle was performed, and everything passed off quite successfully. The external wound healed,



FIG. 1.—Showing the growth as it appeared under the epiglottis.

and the animal was discharged from the hospital on March 24th. The owner was told to give a little walking exercise each day.

On April 28th the horse was sent back to hospital, as the owner said it had a sore throat. When examined it had every appearance of sore throat and irritation of the pharynx, having difficulty in swallowing, although the animal drank a little and also ate a little

bran mash, part of which returned down the nostrils. Two hours later some electuary was given, and also creosote inhalations. No sooner had the inhalations commenced than the horse had a violent fit of coughing, which lasted about half a minute. At the end of that time large quantities of frothy blood were discharged from the nose, the animal walked rapidly round the stable for half a minute and dropped dead.



FIG. 2.—Larynx opened to show the large formation on the left side, and the smaller one on the right side.

On *post mortem* the lungs were found to be full of frothy blood. On opening the larynx, the condition shown in the accompanying photographs was discovered. The left ventricle had healed completely, and would apparently, under normal conditions, have been a perfect cure, but, arising from the point of incision, was a tumour as large as a hen's egg, which almost completely filled the lumen of the larynx. It was of such a size that the epiglottis could not cover it. On the other side of the larynx, where the pressure of the tumour was greatest, another tumour was commencing to form.

THREE CASES OF SARCOMA IN THE DOG.

By CANIS MAJOR.

(1) The champion corded poodle "Japan," winner of 240 prizes, aged 14 years, which I had previously attended for minor ailments, was the subject of a tumour which was discovered upon the left elbow when he was being clipped. It was found to be ulcerated, and the smell resulting from it most offensive. Although suspicion of malignancy was mentioned owing to its size, its discomfort to the animal, and the abominable smell, I was requested to carry out an operation. One feature worth mentioning about this case, and which most peculiarly prevailed in the remaining two cases, was a peculiar steaming or vapour that seemed to arise from the growth. The operation was carried out satisfactorily by means of local anæsthesia on October 10th of last year, and the growth submitted to an expert for examination and reported upon as being a round celled sarcoma. The operation wound, however, healed satisfactorily, and the animal appeared to be progressing satisfactorily until December 20th, when I was urgently requested to attend. Upon the 23rd he passed away, the cause of death being pneumonia, the symptoms during these few days being distinctive of this trouble and not worthy of description. The seat of operation was quite clean and had healed perfectly. Unfortunately a *post mortem* was tabooed, but I am of opinion that the operation brought about the culminating point. My next visit was by request to attend the interment at a canine cemetery some miles distant.

(2) Yorkshire terrier, 6 years old, a great favourite, having been treated by its owner for some time for a growth upon the radial region of the right fore leg. This having increased rapidly in size, I was consulted as to its nature and mode of treatment. It had all the characters of the former growth badly ulcerated, raw, granulating, evil smelling, and steaming. I at once advised the removal of a small portion for pathological examination, a suggestion which the owner did not agree to, in spite of her great attachment to the dog, early operation being requested—in fact, this seemed to be the only alternative. Owing to its size operation was carried out under a general anæsthetic, viz., morphine hydrochlor being administered prior to choloform anæsthesia. The resulting operation left a fairly extensive wound; this was upon December 1st, and appeared to be going well until a fortnight later, when it began to reappear, and by the 26th had increased to its former size, when I was requested to again operate. On this occasion it was a very difficult process to remove all diseased tissues, and the prognosis given very unfavourable. During the period elapsing between the first and second operation,

and subsequently, the animal suffered much constitutional disturbance, having lost all its former spirit, appetite capricious, and frequently vomiting. Once since this date I have seen my patient, and even in spite of the knowledge of its seriousness, the owner has decided to keep it as long as possible, although a higher opinion has been suggested.

The first growth upon removal was submitted to a pathologist, and reported upon as a fibroma; the second recurring growth submitted to the same pathologist minus former history was this time reported to be a spindle cell sarcoma. The termination of the case I am unable to report at present, it being as far as I am aware still being carefully tended by its faithful owner.

(3) An aged Scotch terrier, very poor and emaciated, a frequent visitor to my infirmary, a sufferer from tympanitis. Very reluctant to have the old fellow destroyed, the owner requested me to give him the last attempt at treatment, with permission if this proved futile to put him away painlessly without acquainting owner of my decision. Most careful dieting or treatment failed to accomplish the desired result. No matter how carefully dieted, he became distended with gas. Having been puzzled for a very long time as to the cause of the trouble, I was keenly interested in carrying out a *post mortem* examination, and, seeing how futile any attempt at treatment proved, I obeyed the owner's instructions. The liver was found to be of an enormous size, although this was not evident by palpation during life, owing probably to his tympanitic condition and the difficulty experienced in the examination of the abdominal contents. It seemed to occupy a great part of the body cavity. It had a fatty appearance, although quite firm and solid, not as one would expect in fatty degeneration; nor on section did it show the presence of fat, whilst the spleen exhibited several tumours (about eight in number). A portion of the liver and spleen was submitted to a pathologist, the report stating sarcoma of the liver and hæmatoma of the spleen.

Following this case I was consulted by a resident medical man to examine a terrier with a large raw ulcerating growth partly in the region of the flank and part in the preputial region, commencing, as he described, as a carbuncle. As it appeared to be a great source of irritation to the animal, constantly licking same, its removal was requested, although the doctor feared its malignancy. This was carried out on October 11th under a general anæsthetic. Great difficulty was experienced in the healing of the wound, bandages being skilfully displaced; at last an Elizabethan collar of huge dimensions having to be employed to prevent his licking same. Finally, the wound healed, leaving much thickening and scar tissue after four

weeks' treatment in my infirmary. On December 16th I was again requested to call and examine him, when I found the growth to have recurred, smelling most abominably, and apparently steaming. It is here worthy of mention that the growth removed was submitted to an eminent pathologist, who pronounced it to be granulation tissue, resulting primarily from an abscess. My medical client, who, from the first, feared malignancy, gave as his opinion that he placed little faith in pathological examination, and that it had been his invariable experience that tumours showing this phenomenon, viz., sweating or steaming, was a symptom indicative of malignant disease. This is my reason for reproducing his remarks, and I hope that other practitioners of greater experience may be induced to record their observations upon similar cases.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.*

By A. S. LEESE, M.R.C.V.S.
(Continued.)

POISONS.

Snake-bite.—Camels are liable to be bitten on lips, feet and belly by snakes. Being a large animal, the camel is better able to withstand the dose of venom than are most other species of domesticated animals. Nevertheless, camels are often lost from snake bite of the more deadly snakes. The symptoms and treatment do not differ from those in other species, generally speaking; but, with camels, there is a tendency to bellow loudly and continuously until coma sets in. It is useful to remember this fact, because, when the snake has not actually been noticed, this symptom may be the means of attracting attention and suitable treatment, which may save life. In my experience, if a camel survives 45 minutes after the bite, he recovers.

POISONOUS PLANTS.

There are some general considerations applying to most plant-poisonings to which camels are liable:—

- (i) Camels reared in a district containing a particular poisonous plant are rarely poisoned by it; somehow or other, they learn to avoid it.
- (ii) Camels imported into a district containing a particular species of poisonous plant are liable to eat it and poison themselves, particularly in the dry season, when the poisonous plant is often the greenest in the jungle.
- (iii) Grass-eating camels are liable to pick up a fatal dose of a poisonous plant by accident when their mouths are full of grass.

* For previous instalments, see page 79 (March), page 136 (April), page 167 (May), page 214 (June), and page 259 (July).

Otherwise, most poisonous plants are disagreeable and not voluntarily taken and swallowed, except by camels which do not know them. In this connection, it may be noted that although Indian camels do not usually eat grass, they do so in the rains, when it is green and succulent.

(iv) Speaking rather generally, it is in nullahs and damp places where most poisonous plants which affect camels are found. The moral of all this is, when camels are advancing in unknown country, to see what plants the nullahs contain, and take measures to prevent camels from grazing where these plants are dangerous.

Leaving out of all consideration the camel-poisons of the Australian bush, the subject may be conveniently dealt with by classifying the usual poisons found in typical camel-country as follows, but the list is, of course, only an outline :—

1. *Poisonous Plants Liable to be Eaten when Grazing.*—These are oleander, datura, irgin, sorghum, and others. Oleander grows in nullahs in stony or hilly country, and is also grown in gardens ; it is very bitter, and generally taken by accident in a mouthful of grass ; a small quantity will kill, the chief poisonous principle being an alkaloid, and the action being depressing and irritant. Dulness, vomition, coma, these are the symptoms ; and diarrhœa may occur if the camel is not dead in twelve hours. Datura has a leaf shaped like that of a fig, and the fruit has a prickly capsule ; datura is found chiefly in the beds of dry watercourses. It is sudden in its effects, and is a nerve-poison ; I have never arrived in time to see the symptoms. “Irgin” is confined to the northern part of the British Somaliland Protectorate ; it looks like a lot of green candlesticks curving up from a common stem, and contains a white irritant milky fluid. Irgin is an irritant poison producing pharyngitis, vomition and diarrhœa, but many camels recover from it under proper treatment. Sorghum poisoning, from browsing on a stunted crop of jowari in a rainless season, is a well-known subject and only requires mention here. The Muttur pea is eaten by camels without harm in the form of green forage.

2. *Poisonous Plants Liable to be Fed to Camels among Refuse thrown away by Gardeners.*—This form of plant-poisoning is common in Indian cantonments, oleander, datura and narcissus being amongst the known culprits. Camels should never be given gardeners’ refuse.

3. *Poisonous Plants which Camels do not Eat.*—The various kinds of cactus and euphorbia come under this head, as also does the Sodom apple (*Calotropis procera*). These contain an irritant milky fluid in their stems, especially the last-mentioned, which is found in most camel countries. This juice sometimes blinds camels, which get some of it into their eyes when grazing.

The castor oil plant is found in many camel-countries but the leaves

when eaten appear to have no poisonous effect, and I have no record of any authentic case of poisoning by it in camels.

4. *Plants which afford good grazing to camels which are used to them but which cause indigestion when eaten by imported camels not used to them.*—Among them are salvadoras, salsolaceous plants growing along the coast, garras, mangrove, wild jujube, and many green fodder crops, such as mote, mung, taramira and trefoil. All these should be fed sparingly, at first, to strange camels.

Notes on Treatment of Poisoned Camels.—An oily purge gives the best results, particularly linseed oil, 2 quarts, with turpentine oil, 1½ ozs. Soup from a fat sheep's leg is a good demulcent for the irritant poisons, as also is linseed tea. Hypodermically-given purges may be tried. In Western Australia, potassium permanganate, thoroughly dissolved, is used to neutralise alkaloids ingested in poisonous plants; 1 or 2 drachms might be given. Suitable stimulants are found in strychnine (not exceeding 1½ grains hypodermically), ammon. carb., ½ to ¾ ozs., or rum, 4 to 6 ozs.

Diseases of the Eye.—The camel is very subject to conjunctivitis, keratitis and opacities of cornea, the common causes being injury by thorns, contact of the milky irritant sap of the euphorbias and of the Sodom apple, injury self-inflicted when trying to rub ticks from the eyelids, blows, and so on. Very exceptionally, ocular symptoms are met with in trypanosomiasis in camels, as is the rule with dogs suffering from that disease; in this case, the keratitis is of both eyes. The worm *Thelazia leestii*, which is found in the conjunctival secretion, has not yet been found to have produced conjunctivitis, although one of the worms in an abnormal position is thought to have caused ophthalmia in one case.

Congenital absence of pupil has been seen in a camel. The normal black curtain over the pupil which has the same function as the less-developed corpora nigra of the horse, is sometimes absent in one or both eyes; such eyes are very prone to cataract. Cataract is very common in camels; all sizes, shapes and colours of cataract are met with, and in camels of any age. One-eyed camels are useful for work excepting in mountainous country, where they are liable to fall down ravines. Dislocation of the eyeball is seen in "Kapáli," a disease to be described under "Surgical diseases of the head."

Amaurosis is one of the symptoms of "Mad Stagers"; it also occurs from the ingestion of the pods of *acacia arabica* in large quantities when invaded by a certain red fungus; both forms are curable, the latter often only after some weeks. An incurable amaurosis is sometimes found following suppuration of the frontal sinus; it generally affects one eye only.

SURGICAL DISEASES OF THE CAMEL.

In the general surgery of wounds and abscesses there are a few practical matters which may be mentioned :—

1. Owing to the comparative inelasticity of the skin, accumulations of pus may form under it without much swelling.

2. Camel pus is often so thick in its consistency that it cannot readily escape through small openings. Long incisions are indicated when opening abscesses or making drainage for wounds.

3. There is a strong tendency in camels' tissues to encapsule an irritant agent, *i.e.*, to form inflammatory fibrous tissue around it.

4. In many countries, "fly-blow" has to be guarded against. (Turpentine and vaseline, mixed, is the agent against fly-blow that I favour most.)

The treatment of wounds, etc., in other respects does not differ much from that accorded to other veterinary patients. If crows are a nuisance, a crow's feather tied to the hair close to the wound will prevent them coming to peck at it.

SURGICAL DISEASES OF THE HEAD.

Torn nostrils, tooth troubles and inflammation of the palatal expansion, have been described already. The characteristic diseases of the camel which remain to be dealt with in this region are :—

1. "Kapali."

2. Suppuration in frontal sinus.

3. Fracture of lower jaw.

4. Suppuration in external auditory meatus.

1. *Kapali*.—This is an Indian word and is used for several distinct diseases of the head, but is particularly applied to the extraordinary condition about to be described.

This consists in a phlebitis of the nasal branch of the submaxillary vein, arising from a septic wound about the nose or muzzle ; generally the nose-peg wound is the starting-point, but I have seen it follow an injury to the anterior part of the hard palate between the two upper incisors ; and sometimes a rope gall over the nose is the starting-point. This phlebitis spreads until it reaches the other branch of the submaxillary vein, the one which runs into the supra-orbital foramen in the camel. The inflammation spreads along this vein until it reaches the back of the orbit, and there causes a swelling which pushes the wretched animal's eyeball out until it is "dislocated" and ruptured. By infection through the foramina at the back of the orbit, the camel soon dies of meningitis.

The first symptom is a diffuse swelling of one side of the face, associated with a septic wound about the nose or palate. The camel

goes off his feed early in the attack ; within twenty-four hours the eyeball begins to bulge and is pushed out of its socket ; sometimes both eyes are pushed out (because the two veins are joined by a small branch running over the bridge of the nose). Convulsions, coma and death close the scene within three days.

One wonders how Christian scientists would explain away this horrible disease. Treatment is generally useless, and the poor brute should be shot to save suffering. Under certain circumstances, it might be possible to save life by early removal of the eyeball, but if the camel subsequently died, the veterinary surgeon would certainly get the blame for it.

2. *Suppuration in Frontal Sinus.*—In two important respects, the frontal sinus of the camel differs from that of the horse, although it occupies a similar position :—

(1) It communicates by a curved slit with the nose (and not with the superior maxillary sinus, which is very small).

(2) The supra-orbital foramen pierces the frontal bone near the middle line, so that there is a fairly long bony canal containing the supra-orbital vessels before they reach the orbit. This canal lies in the frontal sinus and forms an "elbow" turn inside it. The only cause I recognise for this disease in camels is a blow over the head. I have never known it follow catarrh, and it could not possibly arise from suppurative alveolar periostitis.

The symptoms differ in detail from those shown by horses. In camels—

(1) Nasal discharge is not invariably present.

(2) When present, it rarely smells.

(3) When present, the discharge generally runs from both nostrils, but most comes from the affected side. (The condition was unilateral in every case I have had.)

(4) As often as not there are marked swelling and tenderness of the frontal bone over the diseased sinus.

(5) Pus has a great tendency to work through the bone and come out on to the face. The favourite places for it to burst out are (a) above the nasal canthus of the eyelids, (b) behind the supra-orbital process of frontal bone, and (c) near the middle line. In the latter case, probing settles which side is involved.

(6) Nasal discharge is not through the curved natural slit of the frontal sinus but through an adventitious opening (the bone being perforated by the suppurative process). There is usually a curious carriage of the head, the nose being tilted higher than usual.

(To be continued.)

Translation.

THE SERVICES OF VETERINARY MEDICINE IN THE WAR.

BY EUGEN FRÖHNER.

THE world-war of to-day has placed important tasks upon veterinary medicine in regard to the treatment of sick horses, the suppression of infectious diseases, and the organisation of the military service. The healing art, which during the last few years, through the operation of veterinary and sanitary police, has been somewhat relegated to the background, again comes into its own through the war. Apart from internal and surgical diseases of army horses, the infectious diseases acquire great significance. In the forefront stands glanders, which moves from east to west, and threatens the readiness for battle of the German army, as well as the horse-breeding industry. The blood test and the eye test together make it possible, however, to suppress it quickly and surely. By investigations in a horse lazaret for glanders it is now undoubtedly proved that glanders much more frequently heals by calcification of the glanders nodules than has hitherto been supposed.

An invasion from rinderpest and the widely-prevailing parasitic bronchitis in the occupied regions of the north of France should be avoided. Effective measures have also been taken against the piroplasmosis prevailing in Flanders and Macedonia, which is spread by ticks (*dermazerator reticulatus*). A disease hitherto unknown in Germany and prevailing in Austria and Belgium since the war, known as infectious broncho-pneumonia, which runs an insidious course, and causes a heavy death rate (mortality 12 to 28 per cent.), has been favourably influenced by intravenous injections of sublimate solution—a quite new procedure in the treatment of lung diseases. Protective inoculations against strangles were quite ineffective, but curative inoculations by means of large intravenous doses of serum—as in petechial fever (*purpura hæmorrhagica*)—were often successful. Pernicious anæmia appeared several times in Flanders and the North of France. Its spread seems to result from insect bites or stings as in piroplasmosis. War rations reduced the peace proportion of cases of illness due to overfeeding, and mostly had a favourable influence on the condition of the horses. Hay and straw could be quite well replaced by heather (*calluna vulgaris*). [The sequence seems to be only natural.—*Translator.*]

Food poisoning in a great number of cases was noticed. Thus intestinal catarrh arose from sugar and molasses poisoning; colic, inflammation of the kidneys, paralysis, laminitis, greasy heels, and other skin diseases coincident with mange were

evident. Castor oil poisoning arose from feeding on linseed cake containing ricinus. Characteristic poisonings were brought about by nibbling the untrimmed pine stems from the walls of shelters, and from the taxus shrubs covering the walls of rifle pits. Besides these, white lead poisoning occurred in horses billeted in a white lead factory; copper poisoning after feeding on wheat dipped in blue vitriol; glanders-like nasal ulcers after inhalation of lime in street dust, and similar diseases of the mucous membrane after disinfection of scabies stalls with lime; numerous carbolic, cresol, and petroleum poisonings as the result of the use of impure preparations in the treatment of mange; there were occasional poisonings due to partaking of laburnum, meadow saffron, beech nuts, dogs mercury and atropa. The copper preparation optochin used in human medicine against inflammation of the lungs leads to incurable blindness; its use in veterinary medicine is, therefore, to be adopted with great caution and only subject to daily use of the ophthalmoscope.

Through the war the relations between human and veterinary medicine are closer. The doctor's war surgery has taken ^{from the} ~~of the~~ veterinarian a good deal, but human medicine has learnt ^{its} ~~the~~ canalising from veterinary medicine, especially in the field of the ^{the} ~~the~~ diseases communicable from animals to man. Glanders and ^{the} ~~the~~ mange have frequently been transmitted to men, and many a veterinary surgeon has experienced glanders infection. The relation of symptomatic anthrax of animals to the so-called gaseous emphysema of man is to-day clearer among doctors than before.

Medical study at the German universities will in future include a course in veterinary medicine.

The military organisation, bad at first, now includes mobile and immobile horse depots and horse lazarets, glanders and mange lazarets, blood examination stations, carcase destructors, etc. Besides the divisional, army, and chief veterinary surgeons, there is still lack of organising personnel of the first rank and more especially of an investigator (research conductor) of the highest scientific eminence—a field veterinary chief.—*Swiss Veterinary Journal.* G. M.

Reviews.

THE TREATMENT OF INFECTED WOUNDS. By A. Carrel and G. Dehelly. Translation by Herbert Child, Captain R.A.M.C., formerly Surgeon French Red Cross, with introduction by Sir Anthony A. Bowlby, K.C.M.G., A.M.S., consulting surgeon to the British Armies in France. Crown octavo, pp. x+238; 97 illustrations; price 5s. net. Publishers: Messrs. Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden, London.

This book explains the principles of what is known at the front

as "Carrel's Method" of treating wounds. The solution used in the treatment is Dakin's hypochlorite, which was produced by Dr. H. D. Dakin, of the Herter Laboratory, New York, and has been largely used by Dr. Carrel, and made a name for itself, not only as an efficient steriliser of a septic wound, but has also been very useful in the treatment of healthy and suppurating wounds. The solution used, if to be of value, must be made strictly according to Dakin, and the technique of sterilisation is to be carried out in the manner described by the authors, and which includes the processes of mechanical, chemical, and surgical cleansing of lesions and their chemical sterilisation. Clinical and bacteriological examination of wounds is of first importance as a guide to treatment. Instillation of the liquid into the wounds is accomplished by a system of tubes, and is done very effectively and thoroughly. Under the influence of this method of wound treatment marvellous things have been done. Compound comminuted fractures of the humerus, tibia, and femur have been successfully treated in a great number of cases without the patient losing the limb, and grave wounds involving articulations have likewise been closed without complications. No man interested in the surgical treatment of wounds ought to miss getting this book. Its pages reveal one of the great wonders of the War, and bring added honour to the records of medical science. The secondary closure of wounds will perhaps interest veterinary surgeons most, but every page in the book is instructive and full of value to those who desire to know how the ideal treatment of a wound is to be carried out. G. M.

ANNUAL REPORT OF PROCEEDINGS UNDER THE DISEASES OF ANIMAL ACTS, THE MARKET AND FAIRS (WEIGHING OF CATTLE) ¹ACTS FOR THE YEAR 1916. Published by H.M. Stationery Office, Imperial House, Kingsway London, W.C.

This report compiled by Mr. A. W. Anstruther, Assistant Secretary to the Board of Agriculture, shows that good work has been done here in the control of animal disease during war-time. Only one confirmed outbreak of foot-and-mouth disease occurred, as against fifty-six and twenty-seven in the two preceding years. Twenty-five cases of suspected disease were reported, but these were unconfirmed. There is reason to believe that there are one or two forms of stomatitis simulating foot-and-mouth, and the differentiation is a matter of much importance.

Parasitic mange is on the increase. Anthrax and glanders showed decreases of four and two respectively from the previous year. In the case of the former disease, in one outbreak the danger of skinning an animal dying suddenly was well exemplified, for the deaths from anthrax of fourteen cows, one horse, one goat, and four calves were traced to the dragging of the skinned carcase of a cow through the barn, across the rickyard, and burying it near a stream.

The modern serum treatment of swine fever was adopted in 79.3 per cent. of suitable cases. The owners of pigs, therefore, responded very well to the offer of serum treatment by the Board. The conditions under which the serum is now applied are calculated to produce the best results.

No animals with scheduled contagious disease were imported into the kingdom in 1915 and 1916, which is very gratifying. G. M.

PRINCIPLES OF MICROBIOLOGY.—A treatise on Bacteria, Fungi and Protozoa pathogenic for Domesticated Animals, by Veranus A. Moore, B.Sc., M.D., V.M.D., Professor of Comparative Pathology, Bacteriology and Meat Inspection, New York State Veterinary College. 101 illustrations, pp. 486. Price 17s. Published by the Macmillan Company, New York.

This is a useful and lucid text-book written chiefly for the student of microbiology. It is admirably planned, so that he who wishes to gain knowledge of bacteria may gradually assimilate information leading up to a complete understanding of their form, life-history, method of examination, place and rôle in nature, the relation they bear to animal disease, and their effects on tissues which they invade. The teacher of proved capacity has an advantage over the mere maker of books in that he is likely to know the varieties of men's minds, the puzzles and difficulties that confront them in learning a subject, and the pitfalls they may encounter in their pursuit of knowledge. Professor Moore seems to have borne these things in mind in the writing of his book with the result that it is very readable and understandable.

The method of dealing with experimental animals, the discussion of protozoology and a discourse on the filterable viruses all receive due attention. The work concludes with chapters on serum diagnosis, and immunity and vaccine therapy, in which the essential facts and principles of the subjects are put before the reader quite plainly. We think this book is a valuable addition to the literature of microbiology, and it has the virtue of not being burdened with extraneous and superfluous matter. To veterinary surgeons, students, and those holding official positions in connection with the control of animal diseases it ought to prove exceedingly acceptable and instructive.

G. M.

ERRATUM.

In the July issue of *THE VETERINARY JOURNAL*, on page 264, second line, Major E. M. Percy, M.R.C.V.S., should read Major E. M. PERRY, F.R.C.V.S.

NOTICES.

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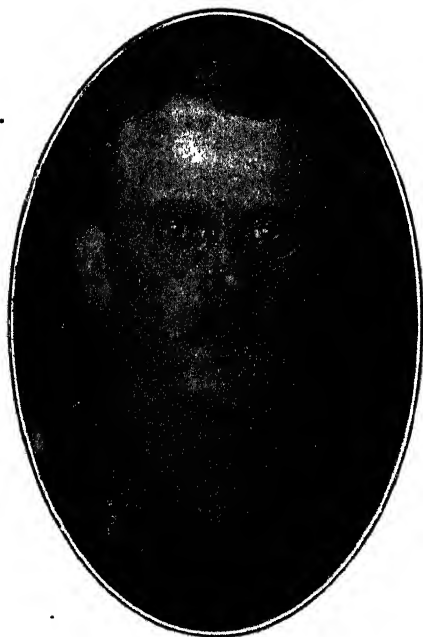
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LIEUT. HOWARD S. TINDALL,
Royal Berkshire Regiment,
Killed in action in Flanders, 31st July, 1917.

THE VETERINARY JOURNAL

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Sub-Editor :

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SEPTEMBER, 1917.

Editorials.

THE RAVAGES OF WAR AND "TRUTH."

WAR has made terrible ravages amongst animals; and horses, in their turn, have suffered equally with men in this ghastly struggle. Attention to this has been drawn many times, but never quite so pointedly as in the above-named weekly periodical during the last few issues.

War is never a drawing-room game, and under the best of conditions there must of necessity be a great many losses. It is easy to sit in an armchair and write lengthy paragraphs to say that this or that should not have occurred. To those who know the terrible conditions under which our animals were compelled to exist during the past two winters the wonder is that any of them escaped, and it was only due to almost super-human efforts on the part of those who looked after them that they did not all perish.

A horse is not a light article, and the fact that his body is supported on four pinnacles, and has to stand upon them night and day incessantly does not improve the foundation upon which he must necessarily be placed. Conditions for men are bad enough where mud (and this is *real* mud to which allusion is made) is in question, but a man is at all events able to get on dry land occasionally, whereas the horse, during the wet season, practically never gets a chance for weeks at a time. Add to that the necessarily continual movements, especially in the regions under shell fire; the diseases which accompany mud and wet and miserable surroundings; internal disorders owing to variations in the quality, character, and quantity of food; the attacks of external parasites, such as mange, lice, and such like, and internal

parasites, such as the *strongylus tetracanthus* ; exposure to shell, bomb, or gun fire ; and a thousand and one other things which the arm-chair critic knows nothing about.

To criticise upon mere figures or statistics is unjust, especially as it is a notable fact that the proportion of actual sickness is scarcely any in excess of that when large numbers of horses are collected together during times of peace.

Let the man who criticises put up a remedy and he will have done a real service to his country. Everyone wishes to do better, none more so than the officers and men of the Army Veterinary Corps, and every day some new benefit is discovered and put into practice ; neither are we too proud to learn from laymen. It is certainly very unfair to blame them for the results of the conditions under which they are compelled to work, unless the critic can prove errors of judgment or administration ; and had the conclusions drawn half a foundation of fact the British taxpayer might rest assured that an enquiry would not only be justifiable but urgently necessary. The reply to questions on the subject, given by Mr. Macpherson, M.P., in the House of Commons, puts the whole thing concisely in a nutshell, and if our critic can show how to avoid or remedy one third of the exigencies therein dealt with, he will have become a public benefactor and have earned the gratitude of everybody on the Allied side.

Criticisms are wise and necessary, but in a crisis like this let them be "constructive," and not "destructive."

ILLUSTRATIONS AS AN AID TO DIAGNOSIS.

To most men, in the words of a well-known advertisement, "every picture tells a story," and a good picture of the lesions produced by a disease makes much more of a lasting impression, and gives a clearer idea than volumes of dry description ; the only thing to beat it being a sight of the actual lesion itself.

In advocating practical illustrations of surgical methods at our veterinary meetings, and in producing illustrations upon every possible opportunity as aids to knowledge, the VETERINARY JOURNAL has ever been to the fore, and this month's number is more than usually well supplied. The article on Ulcerative Cellulitis is an especially good example, and gives at a glance the characteristic clinical appearances of this disease in such a manner that the professional mind cannot fail to recognise it at once.

Illustrative articles from our contributors are always welcome, and if of a suitable nature can always be promised a place of prominence in the columns of the JOURNAL.

Original Communications.

AN INTERESTING OVARIOTOMY OF A TROUBLESOME MARE.

By CAPTAIN GUY SUTTON, F.R.C.V.S.

Army Veterinary Corps.

A TROOPER mare, about 15 hands high, 6 years old, was sent from remounts for ovariectomy, being unmanageable.

I have done over a score for similar reasons, and they have all been subsequently issued. I always use the stocks now, which makes the operation ten times simpler than when they are cast. They



Ruptured Ovary of Mare Discovered during Spaying.

1. Left Ovary Ruptured. 2. Blood Clot. 3. Right Ovary.

are chloroformed as they stand, and do not require a degree of anaesthesia which deprives them of the support of their legs. The latter are shackled to the posts. The external area is washed with soap, and no internal douching is carried out, as I consider this unnecessary and perhaps harmful. The rectum is emptied early in the proceeding. A dose of arecoline is given midway during the 48 hours' fasting prior to the operation.

The photograph shows all the curious conditions presented by the left ovary in this particular case.

The right ovary was normal and was removed. When I felt for the left one, I discovered a large spherical mass, and whilst grasping

this in an endeavour to ascertain its character, I felt a portion come slowly away in my hand. I was completely mystified and drew out what appeared to be a blood clot, spherical, and with about a fourth of its bulk fibrinous, the remaining portion being the colour of ox liver. For the moment I wondered whether it was an ovarian pregnancy. I now explored again and found in place of the normal ovary a flat palmate body at the ovarian site. As I could not think of it being anything but ovarian tissue, I removed it, and found it to be the left ovary completely ruptured throughout the length of its greater curvature, and having the appearance of a split kidney. The blood clot had been enclosed by the two split hemispheres, and a shred of stretched and separated peritoneum. I surmise that the ovary was acutely congested, and that the arecoline was the immediate cause of the rupture.

It is conceivable that complete healing would have taken place in this ruptured gland, and perhaps the occurrence is not so uncommon as might at first sight appear. Frequently ovaries appear to the naked eye to consist largely of scar tissue. Those of this subject did not appear to be abnormal in structure, but the discovery of a partly ruptured ovary during ovariectomy is, I think, an unique surgical experience.

The weights were: Right ovary, 3 ozs.; left ovary, 6 ozs.; blood clot, 9 ozs. The patient made an excellent recovery and returned to duty.

ULCERATIVE CELLULITIS.

THE illustrations of this disease which are here depicted were made by Lance-Corporal Noble, A.V.C., from specimens met with by Captain G. G. Pook, A.V.C., at one of the large hospitals of the Army Veterinary Corps in France. They are most expressive and characteristically true in every detail. Very little letterpress is necessary to enable the professionally trained veterinarian to recognise the disease at a glance.—(EDITOR *V.J.*)

PLATE No. 1.—Illustrates severe and typical cases affecting both the hind and fore leg.

Nos. 1 and 2 are two views of the same leg, a side and back view, which illustrate the extent to which the disease may develop. If a cure is effected in a case of this kind the leg will invariably remain thickened, and on examination the resulting cicatricial tissue of the previous ulcers will be found. This is important, as it helps one to determine if a horse has had a previous attack of the disease.

Nos. 3 and 4 are different cases, and it will be noticed that the affection extends up to the hock.

No. 5 illustrates a case of the front limbs. It is worthy of note that the fore limbs as observed here rarely become affected higher than this illustration. An isolated case or so has been noticed to extend to the knee, however. No. 5 was under treatment for seven weeks and has since been sent away fit. He was under observation for three weeks after the healing of the ulcers, and showed no signs of the recurrence of the disease.

PLATE No. 2 illustrates a case in which the disease is entirely confined to the fetlock as regards ulcers; from the hock down the leg is observed to be swollen. Two views are given to illustrate permanent thickness of leg.

PLATE No. 3 illustrates a slight case affecting both hind legs. The primary ulcer appeared on the near hock; a bulla is noticed directly under the healed lesion. Slight cases of this kind usually do well and leave no thickening of the leg.

PLATE No. 4 was made to illustrate the extent the deformity may reach in a leg during the course of the disease.

PLATE No. 5 illustrates a case in which there is one ulcer present on the leg, and yet the leg has never become swollen. Two large abscesses will be noted on the back, and two smaller ones about the size of a hazel nut, just above the gastrocnemius muscle. The rings on the various parts of the plate illustrate the favourite sites of abscess formations in this disease, notably the neck, shoulder, loin, hip joint and inguinal region.

PLATE No. 6 is illustrative of an affected leg where a number of small ulcers have coalesced, leaving two deep irregular wounds. A large abscess formation is noted at the posterior extremity of the ischium, and it is worthy of note that the original abscess formation was on the other limb.

PLATE No. 7, made at the time of a *post-mortem* examination, illustrates the number of ulcers that may occur during the course of the disease. Nodules are noted extending well up into the internal aspect of the thigh and inguinal region, and small abscess formation in the mammary gland. On microscopical examination and cultures made of the contents of the nodes it revealed the streptothrix, and not organism of ulcerative cellulitis. There were no signs of internal affection in this horse.

PLATE No. 8 is typical of a case in which one finds an abscess formation in the inguinal region and very little affection in the leg, as invariably is the case. When abscesses appear on the body it does not necessarily follow that the legs are affected. This illustration was made on *post-mortem* examination.

PLATE No. 9 illustrates a case of many ulcerous formations both inside and outside of same leg, and the formation of nodules well up the leg. A culture and microscopical examination was made of these nodules, which revealed the Priesz-Nocard organism of ulcerative cellulitis.

PLATE No. 10 illustrates a severe case in which the hock joint has become involved. The sketch was made when the swelling of the hock was at its height; the day following the abscess formation on the internal aspect of the joint burst, from which a copious bloody discharge flowed.

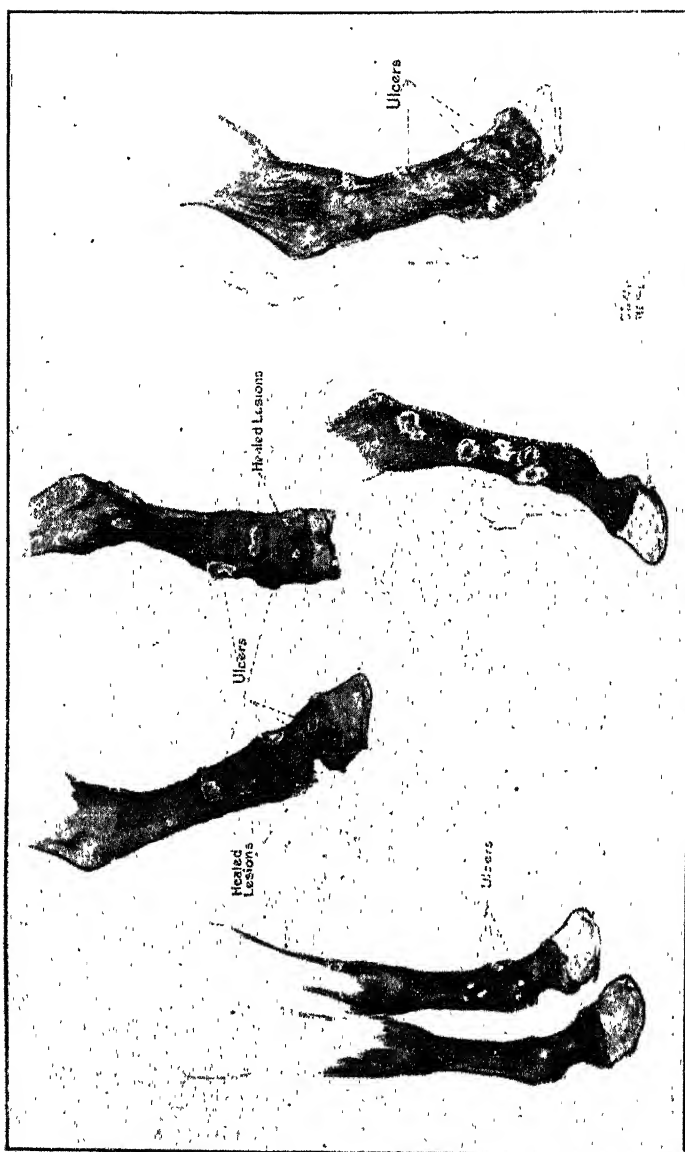


PLATE No. 1.

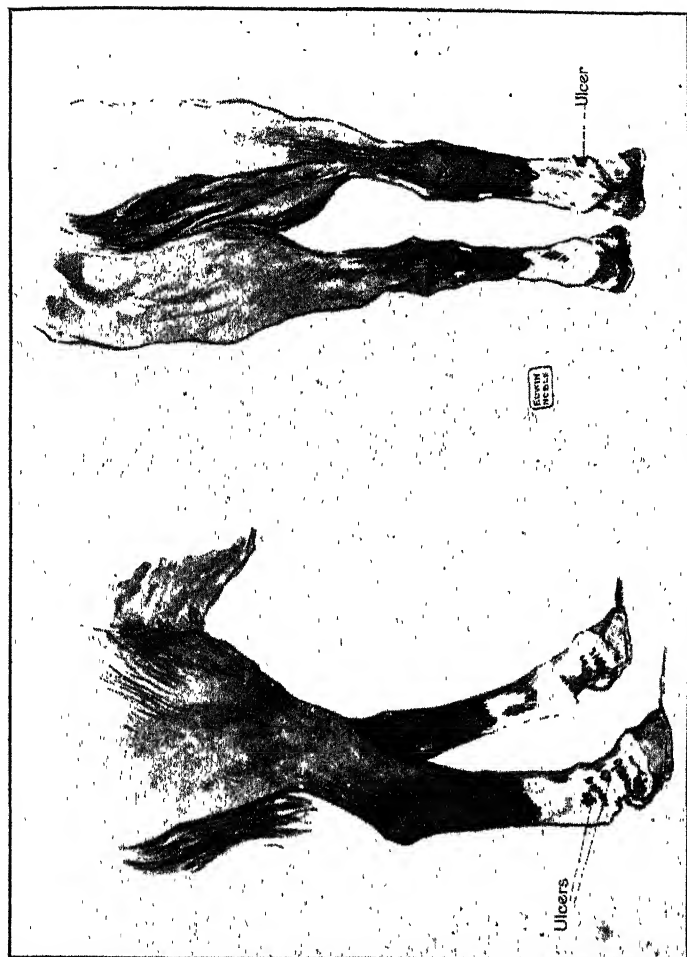


PLATE NO. 2.

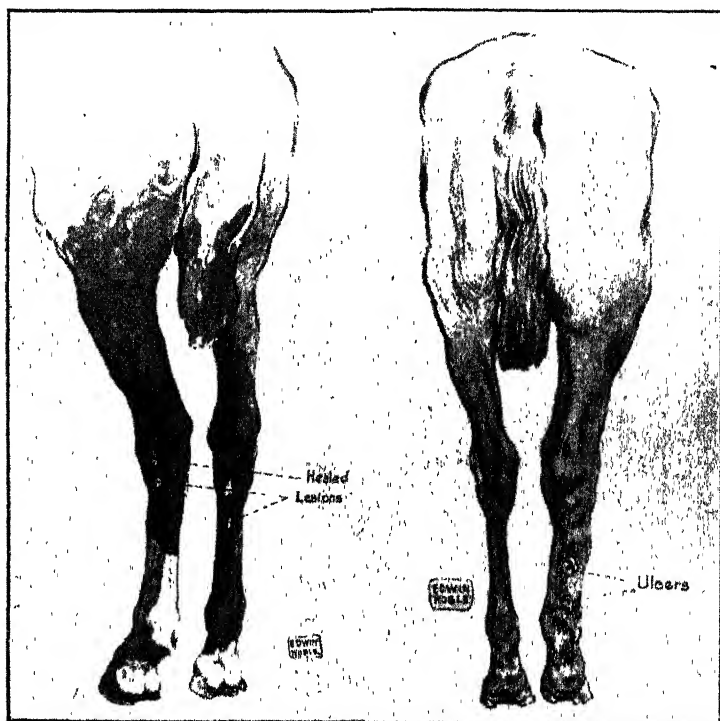


PLATE NO. 3.

PLATE NO. 4. Officer's Charger.



PLATE No. 5.

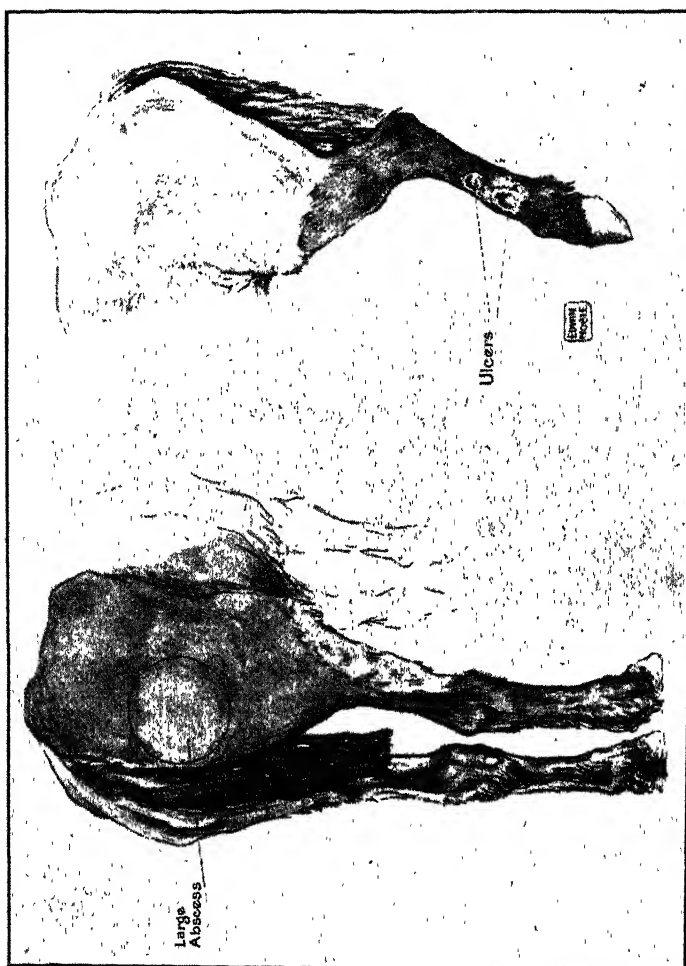


PLATE No. 6.

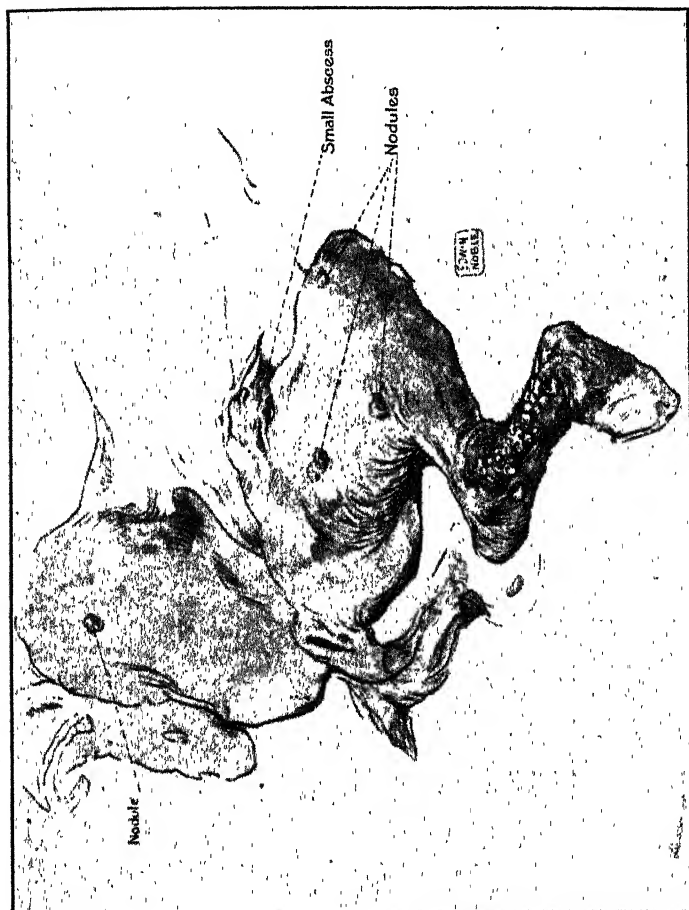


PLATE No. 7.

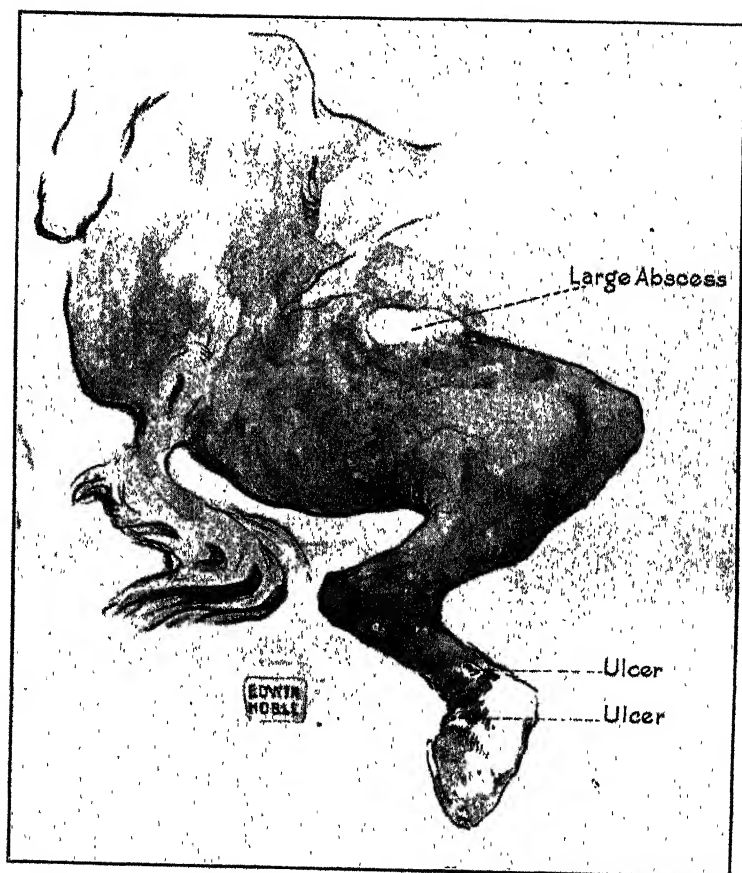


PLATE No. 8.

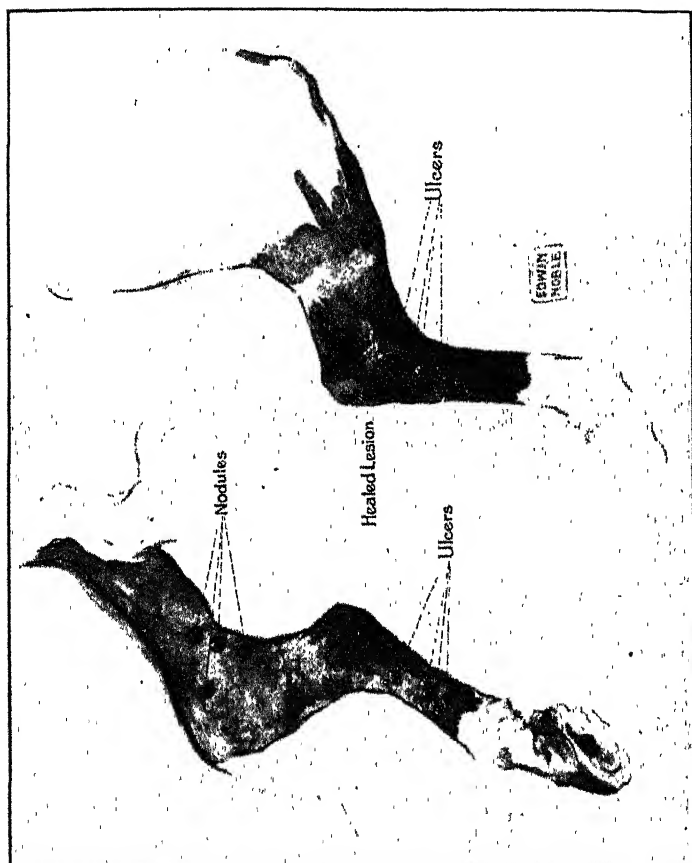


PLATE No. 9.

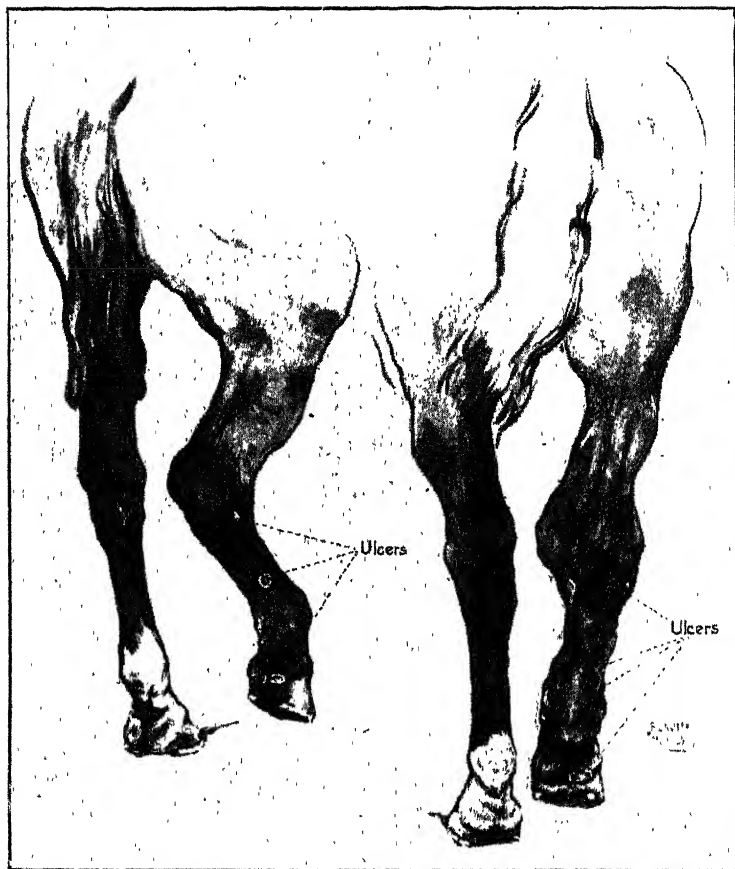


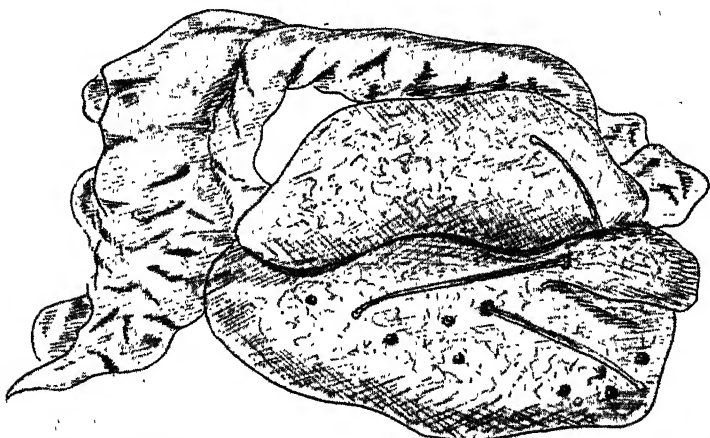
PLATE No. 10. Two views of the same leg.

THE PRESENCE OF *STRONGYLUS ARMATUS* IN THE TESTICLE OF CRYPTORCHIDS.

By MAJOR F. HOBDAY, F.R.C.V.S., F.R.S.E.,
Army Veterinary Corps.

IN the VETERINARY JOURNAL for the month of July, 1915, I drew attention to the presence of the *Strongylus armatus* worms in the substance of the testicle of the horse, stating that they were found fairly frequently in the normal castrations, but that they were rarely met with in abdominally placed testicles. I am inclined now to somewhat modify that opinion, as I have met with eleven cases in cryptorchids within the past two years, and recently came across three cases within a week.

All were true abdominal cases of retention of the testicle, some on the right side and some on the left, and the specimen here sketched had no less than three complete worms in its interior, each in a little nest in the substance of the testicular tissue.



Cryptorchids Testicle (abdominal, right side) containing three complete worms (*Strongylus armatus*).

The patient was a bay rider, about 13 or 14 years old, 15 hands high, and was sent to hospital for some ophthalmic trouble. No mention was made that the animal was a "rig," and it was only when he broke away at the water trough and attempted to "serve" a mare that the sex was discovered.

Upon being cast and chloroformed, two scars were plainly visible and each side was incised. In the left canal the cord was present, but on entering the abdomen on the right side, the testicle illustrated in the sketch was discovered. Upon being cut open, three perfect specimens of the *Strongylus armatus* were discovered.

For the sketch, I am indebted to Staff-Sergeant Weyman, A.V.C. The animal made a good recovery.

A PECULIAR CASE OF "TEMPORARY PARALYSIS (?) OF THE NECK MUSCLES" IN A HORSE.

BY CAPTAIN C. H. S. TOWNSEND, M.C.
Army Veterinary Corps.

Subject.—A bay charger mare, 9 years old.

Previous History.—Had been in France since the beginning of the War, and never had any illness.

Symptoms.—I was called to the case at 10 p.m., and found the mare with her head down between the fore legs, the nose resting on the ground. She was in no pain, and would eat grass off the ground. Pulse, respiration, and temperature were quite normal. The head could be lifted up to its normal position, but at once dropped to the ground when it was let go. There were no signs or history of any injury—the animal was seen at 8.30, when it was quite normal; and again at 8.45, when these symptoms were first noticed.

Diagnosis.—None made. Suggested that it might be due to an injury to a nerve, or possibly the spinal cord, but could say nothing definite.

Treatment.—No medicine was given that night. All food was withheld except a bran mash.

After-treatment and Result.—Next day the mare was lying down and still unable to raise its head. The head was swollen, chiefly along the cheeks; this I had expected, and put down to œdema due to the position of the head interfering with the circulation in the head and neck. Temperature, 103·8; pulse, full and rapid; respiration, blowing; bowels, normal. The animal was not eating so well as on the previous day. I was still unable to account for these symptoms, and thought the case had taken an unfavourable turn. I administered 5iv Aloes, but for no definite reason.

On seeing the mare the following day, I was surprised to find her standing quite normally, head erect, and respiration and temperature normal. The swelling on the head still remained, but was not so large as on the previous day.

No further treatment was adopted, the swelling of the head disappeared, and in three or four days the animal had made an uneventful recovery.

AN INTERESTING PATIENT.

BY CAPTAIN J. MALCOLM ARMFIELD, A.V.C.

I have known the subject of this report for nearly three years, and during that time he has provided me with material for much thought. He is a bay gelding, twelve years old, presumably salted, and the property of the district medical officer, with whom I share stables.

Before he became the property of the present owner, he was very lame in one of his fore legs. There was a small nodular swelling on the fetlock, and, suspecting the presence of a thorn, or grass seed, I had him poulticed. This produced no result; therefore, he was chloroformed standing, cast, and the nodule opened, unsuccessful search being made for a foreign body. However, in a few weeks he was sound again, and I remember no more trouble until he arrived at this station.

His next disease was ophthalmia, one eye being much worse than the other. At the height of the attack, a blue film completely covered one iris, causing total blindness of the eye. Perchloride of mercury (1—1,000), together with purgative medicine, cured the eyes, although a small streak of grey still remains in one cornea. Once or twice since ophthalmia has returned, but it has always yielded fairly readily to simple treatment.

About a year ago, ugly-looking ulcers appeared on the inside of his thighs; at the same time his sheath became considerably swollen. There is epizootic lymphangitis in the district, but smears from the ulcers proved negative. Finally, the animal was cast and the sheath lacerated in two or three places. This seemed to bring relief, as he recovered and returned to work shortly afterwards.

With the exception of an attack of colic, he remained in health for about nine months, but at the time of writing he is just recovering from another similar indisposition. It appeared to originate from a cracked heel on the off hind limb. Very persistent lymphangitis, not yielding to the usual treatment, followed in this limb.

Again ulcers appeared on the thighs, also on the under surface of the tail, and on the penis, the latter organ becoming painfully swollen, the ulcers upon it exuding a clear straw-coloured fluid. Microscopic examination for Rivolta's cryptococcus in smears from all places proved negative. In front of the penis, on each side of the abdomen, swellings appeared, extending forwards for about 18 inches, and raised from the skin to an extent of about 2 inches. An extensive skin eruption now added to the poor creature's sufferings. Small tufts of hair became raised; when they were pulled off they were found to be composed of a grey substance, easily reduced to powder between the finger and thumb. The animal became very emaciated, and, as the owner and myself were frequently away for days at a time, destruction was discussed. However, we decided to give him a chance, and simple remedies, combined with desultory nursing, have now brought him into a fair state of health.

This district harbours large numbers of ticks, of every variety, and it is possible that they have been the sole cause of the swellings

and ulcers. I have seen several equines with similar enlarged sheaths and ulcers, apparently due to poisoning with ticks. But exactly what my patient has had, or has not had, I am unable to say. I am now awaiting anxiously for his next attack, for a mutual companionship has sprung up between us, and I should be truly sorry to lose such an interesting pathological specimen.

A METHOD OF DEALING WITH PUNCTURED AND SUPPURATING EYEBALLS.

BY CAPTAIN A. R. ROUTLEDGE,
Army Veterinary Corps.

THE patient is cast, chloroformed, and cocaine used as a local anæsthetic. Under the usual antiseptic precautions the cornea is punctured and excised with a circular incision following the sclero-corneal junction. As, after the operation, the eyeball is smaller it is advisable to excise a portion of the membrana nictitans. If left intact it bulges, is exposed to the air, and a chronic purulent discharge from the eye results. The operation wounds heal in from fourteen to twenty-one days.

Advantages claimed: The eye heals rapidly, has a very natural appearance, doing away with the unsightly cavernous look usual when total extirpation has been practised. Chronic discharge rarely follows, therefore annoyance from flies, etc., is avoided. Very occasionally it has been found that owing to the shrinkage of the eyeball the upper eyelid becomes inverted. The usual *entropion* operation, as performed on the dog, puts matters right. A large ellipse of skin should be excised, carrying the operation wound well forward on the upper eyelid. Operation on the lower lid is of no benefit and is not advised.

SPASM OF DIAPHRAGM IN A PONY.

BY J. PATON, F.R.C.V.S.,
Stevenage.

ON May 29th I attended an aged pony about 14 hands for stoppage of the bowels, accompanied with fairly acute inflammation. Next morning I was informed by telephone that the pony was better, so that I need not call again. On the afternoon of the same day, a second telephone message came through, stating that "the pony, after drinking a small quantity of chilled water, was ill again, and you could hear his heart beating thirty yards off." When I saw him shortly after, he was standing, and showing great distress. By laying the palm of the hand over the region of the diaphragm, one could feel the powerful contractions of this muscle, running about

45 to the minute. The hollow, drum-like beat could easily be heard thirty yards off. Every spasm sent a certain amount of air rushing through the dilated nostrils with a sound like the puff of a miniature steam engine. It was impossible to take the pulse or hear the heart beat. The mucous membranes were deeply injected. There was no inclination on the part of the animal to eat or drink. I saw it again next day. There was very little change, the regular beat of the diaphragm going on just the same, perhaps hardly so forcible. Strong doses of chloral hydrate were administered without apparently any effect. I should have liked to see the effect of the administration of chloroform, but the owner made up his mind to have it destroyed. I was unable to get a *post-mortem*.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.*

By A. S. LEESE, M.R.C.V.S.
(Concluded.)

Treatment: Considerable judgment is necessary as to the best thing to do for every case. When the camel does not appear to be incommoded, and has a free nasal discharge, and the state of the frontal sinuses can only be indicated by percussion or by exploratory perforation, I find that some camels recover spontaneously, the adventitious orifice through which the pus gains the nasal chamber allowing of sufficient drainage in these cases.

If the camel is in pain, or when swelling of the bone or perforations are seen on the face, the sinus should be trephined. The sinus occupies a very similar position to that of the horse, but to make a neat job so as not to damage the supra-orbital canal and its vessels, and to obtain the best drainage, I prefer to use a small trephine and to let its circumference touch two imaginary lines, viz., one joining the nasal canthi, and one parallel with the long axis of the head and $\frac{1}{2}$ inch from the edge of the orbit. After-treatment consists in flushing twice daily with solution of pot. permang.; when doing this, the nose must be depressed and the head tilted sideways until the solution runs out of the nostrils. Sometimes it is necessary to break down the secondary partitions which subdivide the frontal sinus, to get at the diseased part. It is not uncommon to find the eye on the affected side amaurotic; and my experience is that the camel never regains the sight of the affected eye in such cases.

3. *Fracture of the Lower Jaw.*—This occurs when fighting, and the

* For previous instalments, see page 79 (March), page 136 (April), page 167 (May), page 214 (June), page 259 (July), and page 294 (August).

fracture is nearly always transverse, and through one or both tush sockets (the weakest part of the lower jaw). Treatment for this fracture gives good results if adopted early. When suppuration has already begun, the case is apt to be tedious. The best treatment is to notch two teeth on each side of the jaw, one in front of and one behind the fracture, with a sharp file and near the gum, just sufficiently to allow a string to grip on the notch, and then, having the broken part of the jaw supported in its proper position, bind the notched teeth of each side with string in such a way as to maintain it there. The camel can pick up his own food if placed in front of him, but of course must not be sent out to graze until the bone has "set," say for four weeks. The string should be examined twice daily, and changed and tightened whenever the fractured piece is in the least inclined to sag. Care should be taken that, when the bone is "setting," in the second week particularly, the jaw is trained into its place perfectly straight in both planes to prevent subsequent trouble with the teeth. In East Africa I managed to get a camel fit for active service within five weeks after this fracture and another veterinary surgeon could find no trace of the fracture. If the camel is sent out to graze too soon, the strain on his jaw will undo the work of three weeks. String is preferred for supporting the jaw because it is more easily altered and manipulated than wire. As to the teeth around which the supporting strings are adjusted, the one in front of the fracture is always an incisor, but the one behind the fracture may be tush or wolf's tooth. Sometimes one tush is so loosened by the original injury as to need extraction. The chief thing is to prevent the camel from stripping leaves from trees and branches until the jaw is firmly set by bony union.

4. *Suppuration in External Auditory Meatus*.—Although I have frequently met with this disease, I am ignorant of its cause. The pus comes from a depth which makes exploration impossible. I generally have these cases syringed with Pot. permang. until the pus becomes thin and scanty, after which I stuff the meatus with boric acid. My own experience is that this disease results in recovery in the long run, but may take months. Probably a small foreign body is the causal factor in many cases, but this is a guess.

SURGICAL DISEASES OF NECK AND TRUNK.

Camels sometimes *fracture* their *vertebræ* by falls. The "*wry-neck*" which is seen in certain diseases is only a symptom, the cause of which was explained under "*Cold-struck*." *Enlarged thyroid glands* are met with sometimes, but, in adults, are of no clinical importance. *Saddle galls* are treated as in other animals, but are often over-dressed by dressers. Sore withers sometimes need the sawing off of the tops of the superior spinal processes; sore loins may require a similar removal

of the ends of lumbar transverse processes. There is plenty of room for good surgery in treating sore withers ; but necrosed soft tissues are often better torn out than cut out. The cartilage of prolongation of the scapula is more easily underrun than in the horse, owing to its position, and when that happens the case is generally incurable. In some districts, sore withers have to be protected by a leather shield to prevent them being torn open by the branches of thorny trees on the grazing ground ; and, in some parts, a crow's feather must be tied to the hair near the sore. Vaseline with a little turpentine mixed in it is my favourite application against flies and for encouraging the skin to grow from the edges of saddle-sores.

Fractured ribs.—The normal number of pairs of ribs in camels is twelve ; but I have several times found a thirteenth pair, very rudimentary, and never attached at their upper ends to the first lumbar vertebra.

Fractured rib is common in camels from blows and may be multiple, and of any degree of severity up to penetration of the lung. The treatment is the same as in ordinary veterinary practice ; but as, when the camel is sitting, the rib is a weight-bearing bone, it is very important never to tie camels down which have this fracture.

Sublumbar abscess has been met with, causing emaciation, low fever, and difficulty in barracking and in rising. I do not know the cause.

DISEASES OF THE PEDESTAL.

The pedestal is composed of the following structures :—

- (a) the Horny pedestal, or outer layer of horn.
- (b) the Sensitive pedestal, or secreting membrane.
- (c) the Fibro-cartilaginous pedestal, or Base.

(d) the Sternal Boss, the part of the Sternum which is the "foundation" of the Pedestal, and which is, of course, bone.

Cracks in the horny pedestal, which is only about $\frac{1}{4}$ inch thick, are caused by sitting in pools of water in rainy weather. Sometimes there is some irritation of the sensitive pedestal beneath it, due to the entry of sand or gravel into the cracks. Treatment consists in the removal of grit, the application of Stockholm tar to the cracks, and protecting the organ by sacking slung from the back. Bruises of the pedestal are due to sitting down on sharp stones, particularly in camels imported into stony country from a sandy desert, and which have soft horn ; or to barracking when heavily loaded and weakened by disease or privation, and so coming down "hard." If the bruise is near the edge of the pedestal, any suppuration arising in the sensitive pedestal will find its way out between hair and horn before much damage is done. But if the bruise is central, and suppuration under the horny pedestal occurs there, the pus cannot easily escape ; it may burrow between

the sensitive and horny layers, and, when it does, the burrowing is always towards the posterior edge, where it eventually finds exit; but sometimes, before the pressure is thus relieved, the fibro-cartilaginous base may become infected, and then the case becomes serious. Abscesses may then form in the base and break out at the sides of the pedestal through the skin; or enormous enlargement of the posterior half of the base may occur from the formation of a mass of new fibrous tissue around a small abscess; or the sternum itself may become involved, with suppurative osteitis. In all degrees of injury of the pedestal from bruising, the principles of treatment are the same—to rest the part (*i.e.* relieve it from its function of weight-bearing), to give exit to pus, to get drainage, and to remove necrosed tissue. Suppuration of the sensitive pedestal near the edge can generally be dealt with by evacuating it between hair and horn. Pus forming under the centre of the horny pedestal must be removed by cutting through the latter. Abscesses in the deeper layers of the pedestal require a bold and thorough operation for removal of all diseased fibro-cartilage or bone, but it is only worth undertaking when the patient is in good condition. I prefer to trephine from below in the centre of the pad (and again, from one side, in some cases), so as to get freely at the parts with a curette. The enormous enlargement by new fibrous tissue which sometimes occurs is treated by operation; the posterior enlarged part is sawn off obliquely, preserving as much of the anterior part as is normal and not involved. The hæmorrhage is great and can be controlled best by sawing a little at a time; the capillary bleeding is stopped with a flat firing-iron. The great wound which remains should be covered with a thick layer of tow, and over that an old cushion should be secured, the whole application being supported by bands over the back. It is surprising how little discomfort the camel shows; indeed he is undoubtedly relieved, since the operation exposes and evacuates the causal abscesses. All serious operations on the pedestal call for chloroform; niggling surgery is quite useless. In all degrees of pedestal injury, the camel must never be tied down in the sitting position. I have tried several kinds of appliances for taking the weight off the diseased pad when sitting, but they are not very satisfactory. There is, however, nothing to prevent camels with this disease being put into slings if the latter and a suitable tree are available; the object of the slings is to prevent barracking.

LAMENESS AND SURGICAL DISEASES OF THE LIMBS.

In the camel, lameness is a much more simple subject than in equine practice, provided one knows the diseases he is liable to. In addition to the ordinary means of diagnosis, one can obtain further information on a case by carefully watching him whilst he is in the act

of barracking and of rising, when any painful joint will be strongly "favoured." Foot-lameness in the camel is generally made obvious by swelling; there are practically no internal diseases of the foot except penetration by thorns. Shoulder and hip lameness are extremely common in camels. It is very seldom that one need handle the limb below knee or hock. If one desires to lift a forefoot, say the near fore-foot, the left hand is placed over the triceps region, and then, by bending down and catching the cannon with the right hand and simultaneously throwing one's weight on the left hand, the foot will come up. The hind-feet are not easily handled unless the camel is roped fore and aft and rolled on to his side.

Veterinary surgeons ought to know that the upper parts of the camel's limbs are covered by a layer of yellow elastic fibrous tissue so arranged subcutaneously as to take much of the strain off the muscles during progression. The action of this elastic tissue is easily demonstrated when, in a camel lying prostrate with a fore-leg extended, one bends the fetlock joint: the foot will fly up and strike the chest. It is the possession of this layer of tissue which makes the camel so tireless, although he has comparatively poor muscular development.

Two other anatomical characters, at least, must be noticed by clinicians. One is the "double-jointed" hock, in which the joint formed between the astragalus and calcis on the one hand, and the cuboid and scaphoid on the other is ginglymoid, and not a gliding joint, this arrangement making it possible for the camel to flex his hock until the tibia and metatarsus come into line. The other point is the existence of an elastic pad of yellow fibrous tissue below each digit in the foot, which prevents "jar," and so saves the camel from most of the lamenesses due to concussion.

Injuries to the limb-pads, which exist at the elbow, knee, stifle, and outside of hock, are dealt with in a similar way to injuries of the pedestal, and need not again be mentioned.

SURGICAL DISEASES OF THE FORE-LIMB.

The characteristic camel-lamenesses of the fore-limb are as follows:—

1. Fracture of acromion process of scapula.
2. Fracture of rim of glenoid cavity of scapula.
3. Rheumatism of the shoulder.
4. Sprain of the tendons binding the shoulder-joint.
5. Dislocation of the shoulder-joint.
6. Abscess of prepectoral lymph-glands.
7. Fractured humerus.
8. Brushing between foreleg and body (three varieties.)
9. Fracture of radius.

10. Chronic strain of knee and fetlock joints in young camels, resulting in permanent knock-knees and "bandy" fetlocks.
11. Fractured metacarpus.
12. Exostoses of metacarpus (rare).
13. Sprain of flexor tendons (tendinitis and synovitis)
14. Rheumatism of flexor tendons (rare).
15. Brushing (fetlock or foot).
16. Open sesamoideal sheath (from bites).
17. Fractured os suffraginis.
18. Foot-soreness and bruised sole.
19. Punctured wounds of foot.
20. Whitlow.

1. *Fracture of Acromion Process of Scapula.*—In camels, the acromion process is a finger-like projection, pointing, as it were, to the shoulder-joint. It is sometimes broken off by a camel colliding against a tree or falling. The fracture causes dead lameness, although a little weight can be placed on the limb, and a swelling over the shoulder region above the joint. The swelling is not half that noted in dislocation of the joint. The treatment is removal of all loose and necrosed bone by operation; and this results in complete cure, provided the operation is thorough and not "niggling"; chloroform should be used to ensure thorough searching. The loose pieces are generally drawn a little downwards and backwards by the muscles.

2. *Fracture of rim of Glenoid Cavity of Scapula.*—This sometimes happens in loaded camels which have done "the splits" on slippery ground. The fractured pieces are on the external side and may be quite small, but the condition causes incurable shoulder-lameness and muscular atrophy, and after the acute symptoms have passed, one can hear a "crack" in the joint when the camel is walked.

3. *Rheumatism of the Shoulder.*—This is an important disease of camels, about which there is much yet to be learned; yet the cause is almost certainly rheumatic. There are three circumstances which predispose to it, viz.: grazing on certain species of plants or trees, working plains camels in hilly country, and changes of seasons. In India the almost universal opinion of camelmen is that the disease is brought on by grazing on the fresh young shoots and leaves of the Shisham tree in the spring; and my own observations tend to confirm that this is a predisposing influence. Yet in Somaliland the disease occurs and there are no Shisham trees. I believe also that camels used to drinking briny water, or used to grazing on the alkaline salsolaceous plants found in certain deserts, are liable to this disease when they come on to fresh water and acid grazing.

The disease occurs suddenly and is characterised by great stiffness

of both shoulder-joints without any external swelling. The camel, if made to barrack, will resist strongly, and on touching the ground with his knee, may probably fall right over, to avoid the pain of bending the shoulder-joint. As the acute stage passes off, the animal becomes able to barrack, but he does so slowly, sliding his knees forward on the ground so as to avoid flexion of the shoulder, and settling down to the ground slowly. Novices might easily think his pain was in the loins. The lameness tends to wear off with exercise; the stride is shortened, and, in riding camels, the head is carried low. The rheumatism sometimes permanently lames the camel, but I think this is due to camelmen not resting the animal until he is sound, because they are inclined to think that, because the lameness wears off with exercise, exercise must be good for the disease. When complete rest is given from the first onset until freedom from stiffness or lameness is obtained, many camels recover. The prognosis is the difficult part, and must be based on the length of time the camel has suffered, and the degree of stiffness or lameness. Old cases, when met with on active service, are best worked on, if slight. In treatment, complete rest from work, and access to salsolaceous plants are the chief things; sodium bicarbonate may be given daily, followed by a spell of arsenic treatment. Firing does no good. In this, as in many other lamenesses, "complete rest" is not obtained if the camel has to cover many miles daily on the grazing ground to pick up a living. On the first onset, 2 lb. Epsom salts may be given with advantage. The lame camel should not be tied down in the sitting position, and should be rugged up at night.

4. *Sprain of the Tendons about the Shoulder-joint.*—Causes: False steps in rough country, or slipping on a muddy surface. Symptoms: lameness with a short step and a tied-in gait, and an endeavour to prevent flexing the shoulder when barracking. Treatment, as in horses. This is, perhaps, the common camel lameness, and its cure chiefly depends on the animal getting, from the first onset, complete rest until he can run without any suspicion of stiffness. The recovery will take place quicker, therefore, if the country can produce some sort of forage which can be substituted for grazing, thus preventing the necessity of the animal walking about all day.

5. *Dislocation of the Shoulder-joint.*—The camel is the only domesticated animal in which this injury is not an unusual one. It occurs from the same causes as "sprain." The huge bulging made by the head of the humerus cannot be mistaken. I have met with several cases, but always under circumstances in which reduction under chloroform could not be attempted.

6. *Abscess of Prepectoral Lymph-glands.*—The prepectoral glands of the camel form two groups, one easily palpable at the base of

the neck, the other just inside the first rib. Abscess in the prepectoral gland is quite a common disease, and its exact cause is unknown ; it may be botriomycotic in many cases. There is considerable fever and lameness until the pus is evacuated, but the local treatment is on the usual lines ; I wish to deny absolutely the statement which has been made that you must never foment a camel's skin or something dreadful will happen. It is not true. A dose of 2 lb. Epsom salts may be given in this disease with advantage.

7. *Fractured Humerus*.—Sometimes occurs in riding-camels suddenly from (apparently) a false step. Incurable.

8. *Brushing between Foreleg and Body*.—This is a common disease, and there are three distinct varieties.

The first variety is due to friction of the inside of the forearm against the side of the pedestal. Pathologically, the two lesions exactly resemble the human "corn" ; although sometimes friction is so severe that the epidermis is worn through before it has time to hypertrophy, and then there is hæmorrhage at every step. I have seen the epidermis so thickened in this disease as to resemble wood in its consistency. The lesions make the camel take a short quick step, and he will take on a sort of sidelong gait to shift his body away from the tender side. The larger the lesion grows, the worse the friction is, and eventually the camel actually goes lame. The chief cause of this form of brushing is in the conformation, particularly turned-out toes and a narrow chest ; it is also brought on by overloading young camels, by working plains camels in hilly country, by steep descents under a load, and by favouring a lame limb and so shifting the weight of the body too much to one side. It is impossible to cure advanced cases ; in slight cases the swellings can sometimes be reduced by complete rest on full rations (so that the camel has not to go out grazing) and by the use of blue ointment ; but one is rather helpless against this disease.

The second variety is caused by the squeezing in the axilla, at every step, of a fold of thickened skin. This fold is caused by working the camel when he has the skin of the axilla thickened by ticks, mange or mange-dressings. It is a bad form of brushing, and causes much pain, and often hæmorrhage in the axilla. Treatment involves complete rest and surgical removal of the fold of skin by a careful operation, and that throws the camel out of work for a long time.

The third variety of brushing consists in friction between the elbow-pad and the skin over the chest, some distance above the pedestal. It is less serious than the other forms because the skin over the chest is loose and "gives" under pressure of the elbow-pad, and so does not readily become sore. If the camel is rested before soreness occurs, the skin may thicken sufficiently to protect him in this form of brushing.

9. *Fracture of Radius*.—I have seen deferred fracture of this bone in camels.

10. *Chronic Sprain of Knee and Fetlock-joints* in young camels. The damage is done during the first year of life, and is caused by the young camel having to follow his dam over stony, hilly country whilst his joints are immature and unfit for it. The veterinary surgeon on active service will only meet with the resulting deformities in the adult: they are excessive knock-knees and inward-bending fetlocks, sometimes with compensatory exostoses. Many camels so deformed can do packwork without any lameness.

11. *Fracture of Metacarpus*.—I have had very good results in treating simple fractures of the metacarpus with the help of plaster of paris and of iron splints. The natural sitting position of the camel enables him to rest this bone completely. It takes about seven weeks before he can bear his weight on the leg, and three months before he can work at the walk.

12. *Exostoses of Metacarpus*.—These are from camel-bites and blows. If lameness is present, treat as in equine practice.

13. *Sprain of Flexor Tendons*.—This is only common in fast riding-camels and is treated as in equine practice.

14. *Rheumatism of Flexor Tendons* takes the form of synovitis of sesamoideal sheath; treat by bandaging with dry flannel puttees, and medicinally as for shoulder rheumatism.

15. *Brushing (Fetlock or Foot)*.—This is only serious in riding camels. Either from excessively large feet or from the forelegs being too close together, brushing may occur on the fetlock or on the foot about 2 inches from the ground. Riding camels which develop this habit are unsafe to ride.

16. *Open Sesamoideal Sheath*.—The sheath of the flexor tendons is sometimes opened by bites of musth camels. The condition is too serious to be worth treating on active service.

17. *Fracture of Os Suffraginis*.—The camel has, of course, two digits in the foot, and it was only one bone which was fractured in the cases I have seen. The baggage camel is a good subject for the treatment of such a fracture, although sometimes an exostosis forms which interferes with the flexor tendons and causes permanent lameness.

18. *Foot Soreness and Bruised Sole*.—The structure of the sole from below upwards is made up of:—

1. Horny sole, varying in thickness in different breeds, from $\frac{1}{4}$ to $\frac{1}{2}$ inch.
2. Sensitive sole, or secreting membrane.
3. Two yellow elastic pads, one for each digit.
4. The tendons and small sesamoideal sheath.

The horny sole may wear thin, particularly in camels brought from sandy deserts and put to work in stony country ; the feet of the desert camel are usually softer than those of the hill camel. The sensitive sole becomes inflamed and there is some swelling of the foot. A similar condition may arise from cracking of the horny sole after a march over wet and unsuitable going. Treatment is rest, application of Stockholm tar, and a leather boot to protect the foot until the horn has grown again. Bruised sole is caused by treading on stones when loaded, especially in camels not used to stony country. The foot swells, there is lameness, and on testing the foot a tender place will be found in the sole. Very often there is an exudation from the sensitive sole and it becomes palpable by bulging and fluctuation. A knife should then be passed, at the bulging point, through the horny sole and no deeper, and the fluid and any necrosed soft tissues can be pressed out. The elasticity of the foot prevents the re-accumulation of fluid and the only after treatment necessary is to dab on Stockholm tar.

19. *Punctured Wounds of the Foot.*—In the camel, such punctures are generally made by thorns. In India, the Garinda thorn is the chief culprit ; in Somaliland, it is generally one of the long *Acacia* thorns. I have nothing particular to say about treatment, which is on general lines. The puncture is troublesome when one of the elastic cushions is punctured ; and often incurable if the tendon-sheath is reached by the thorn, the camel being rather subject to septicaemia when the sesamoideal sheath becomes septic.

20. *Whitlow.*—Each digit of the foot is capped in front by a small claw, under which is a small area of sensitive laminae. Whitlow is suppurative inflammation of this tissue under the claw. In camels, if there is any difficulty in draining or evacuating pus, it is best to remove the claw and treat the parts below directly.

SURGICAL DISEASES OF HIND LIMB.

These include :—

1. Fractured pelvis (very rare).
2. Dislocation of hip joint with fracture of articular head of femur.
3. Sprain of hip-joint.
4. Abscess of superficial inguinal glands.
5. Luxation of patella.
6. Sprain of stifle-joint (?)
7. Fractured tibia.
8. Sprain of flexor metatarsi.
9. *Hyæna* bites.
10. Sprain of gastrocnemius at its insertion.
11. Brushing at point of hock.

12. Luxation of tendon of Achilles.
13. Arthritis of hock-joint.
14. "False spavin."

The diseases of the parts below the hock closely resemble those in the fore-limb.

1. *Fracture of Pelvis*.—I have seen two cases. One was a fracture of the ilium and suppurating, and the owner was just starting from Nushki, in Baluchistan, to Meshed (Persia), taking the camel with him unloaded; this gives some idea of the endurance of pain that camels possess. The other case was a fractured ischium; the tuber ischii had disappeared from its usual position, and a large bony swelling developed near the hip-joint; this case recovered completely, becoming quite free from lameness or stiffness in all its movements in spite of the shortened quarter. The camel should be a good subject for treatment of pelvic fractures.

2. *Dislocation of Hip-joint with Fracture of Articular Head of Femur*.—Not an uncommon occurrence and happens when the hind-legs slip apart on muddy ground. In my experience, it has always been in camels under six years old, in which the articular head of the femur is not yet firmly united, having a separate centre of ossification. The articular head breaks off, the ligamentum teres ruptures, and the articular head is carried outside the cotyloid cavity; the fractured surface on the femur is then brought into contact with the cotyloid cavity. Diagnosis is easy if one knows what happens in these cases; the immobility, the inability to bear weight, and the great swelling over the region of the joint are characteristic. The condition is incurable, but nature makes great efforts in these cases, and I have seen camels working which were subsequently found to have the articular head joined to the ischium by a huge exostosis, and a sort of improvised hip-joint, the femur having worn smooth in the cotyloid cavity. Needless to say, the camels were in pain, especially when barracked, and no European would use a camel so affected.

3. *Sprain of Hip-joint*.—This is a sprain of the ligamentum teres. Symptoms: Lameness; a shortened stride of the lame limb, which is brought forward with difficulty; a sidelong gait, the quarters being inclined away from the lame side; no swelling; a great unwillingness to lower the hindquarters when being barracked, particularly during the stage when the hip-joint is being flexed, the weight of the body being thrown on to the sound side. The only treatment, practically, is rest from the first onset until quite free from lameness; if possible, the forage should be brought to the camel so that he will not have to go out and graze; and the camel must never be tied down. Cases rested from the onset generally recover unless the sprain is very

severe ; but by working them before they are fit, very many are lamed permanently, and show atrophy of the quarter.

4. *Abscess of Superficial Inguinal Glands*.—Not uncommon, and is curable by treatment on the usual lines.

5. *Luxation of the Patella*.—None of the chronic cases I have met with proved curable ; the extreme flexion of the stifle in the natural sitting position makes permanent recovery almost impossible.

6. *Sprain of the Stifle-joint* (?).—Camelmen are fond of diagnosing stifle-lameness, but, in my opinion, it is very rare, and most of the cases fired by them over the stifle were lame from sprain of the hip-joint.

7. *Fractured Tibia*.—Transverse fractures are not worth treatment on active service. Deferred longitudinal fractures, however, have been met with, as are so often seen in equine practice, without displacement, and when this is diagnosed, the camel should be fed and watered where he stands and, if possible, not moved from the spot for three weeks ; I have had one or two good recoveries, and found that the patient would not attempt to sit down until about fourteen days after the injury, when the fissures have begun to unite.

8. *Sprain of Flexor Metatarsi*.—This lameness is more common in camels than in horses, but the symptoms are identical. It is done by slipping on muddy surfaces, the foot sliding out behind the animal. Treatment : Complete rest and blistering, but they are very obstinate cases.

9. *Hyæna bites*.—The hyæna often attacks the hind parts of camels tied down in the sitting-position and so unable to defend themselves. The favourite points of attack are the crural muscles above the stifle, and the gastrocnemius. It is marvellous how good the recoveries are from these bites, even when the camel is nearly hamstrung by them.

10. *Sprain of Gastrocnemius Tendon at its Insertion*.—There is a slight painful enlargement at the point of the hock ; lameness may be absent, but the camel cannot rest when barracked, because of the stretching of the inflamed fibres in that position. He remains workable under light loads but if complete cure is desired, nothing but a long rest (and never tied down at night) will do it.

11. *Brushing at the Point of the Hock*.—Sometimes seen in riding-camels. The point of one hock rubs against the point of the other, and a painful swelling, often "callous" like a human corn, is formed on each leg. Like so many of the diseases of the hind-leg of camels, the condition is not permanently curable.

12. *Luxation of Tendon of Achilles*.—This common disease is known in India as "Ragl," and in Somaliland as "Sivr." It never causes lameness, and is only perceptible when the camel is sitting. It is

brought on by the habit some camels have of sitting on their hocks and not on their feet ; and by want of tone in the muscles after some sickness, particularly when the animal is made to lift heavy loads before he is fit. The normal sitting position obliterates the angle between tibia and metatarsus ; and, as a result of this extreme flexion of the hock-joint, the tendon of Achilles has to pass over a pulley formed by the lower end of the tibia ; and at this weak point nature has not provided any great support to the tendon, and it is liable to slip outwards off the convexity ; this is the condition I have called "luxation."

There are all degrees of this "luxation" ; some camels have tendons which are easily pushed out of place, but never slip out of their own accord, and these cases are practically sound. When, however, the tendon slips outward off the end of the tibia when the camel is sitting, it is a serious unsoundness. The camel may be able to rise under a load with an effort which brings the tendon back into its place with a snap, but every such effort aggravates the luxation. Eventually, if only one hock is affected, the leg becomes devoid of lifting power and the camel can only rise under a very light load ; whilst, if both hocks are involved, he may at last be unable to rise off the ground at all.

Treatment : Slight cases due to want of tone of the muscles in debilitated animals sometimes recover by rest and a proper full diet, which remove the cause. Old-standing or severe cases often prove incurable ; but a deep firing along the inside edge of the tendon where it normally lies over the end of the tibia (and taking care not to damage the posterior tibial artery) may occasionally succeed in forming adhesions which give the tendon support.

13. *Arthritis of Hock-joint*.—Sometimes a camel develops acute arthritis of a hock joint without any obvious cause. Most of the cases I have seen developed during the night, nothing being noticed wrong the previous evening ; and generally in wet weather. I think there is good reason for suspecting the disease to be a form of rheumatism, although, of course, it would be easy for a careless camelman to damage the hock-joint by a blow with a stick when the animal is barracked, because, in that position, the joint is decidedly exposed owing to its extreme flexion. The affected camel, if made to sit, endeavours to straighten his hock by rolling on to his side ; and a tender swelling on each side of the Achilles tendon just above the point of the hock is found when the joint is flexed. The camel takes a longer stride with the lame leg than with the sound one. If the camel receives complete rest (involving feeding him where he stands) from the first onset, and is not tied down, the disease may not progress beyond the stage of synovitis, and a slow but sure recovery can be

expected. He must not be worked until he has been able to run sound for several days at least. If worked or exercised too soon, the disease develops into an ulcerative arthritis in which the articular cartilage gets eaten away and exostoses form about the joint. This chronic arthritis is incurable and is easily recognised by the diffuse bony enlargement of the joint and the obvious hock-lameness.

During the synovitis stage, the camel should be rugged up, and given 2 lb. of Mag: Sulph. I have not yet met with this disease outside India.

14. *False Spavin*.—Enlargement of the inner and upper end of the metatarsus results from blows—sometimes from sprains of ligaments. Lameness is only temporary, but the enlargement may be permanent. There is no disease of the camel that I have yet seen bearing any real resemblance to the true "spavin" of horses.

Conclusion.—The foregoing paper is admittedly only a superficial account of the camel's diseases, and has been written from memory only. Veterinary surgeons must therefore deal gently with any inaccuracies which may have crept in; the paper has been written in the back-country of Somaliland, and all my notes and records are at home. I hope that those whose experience with camels brings new facts to light will ventilate them in the VETERINARY JOURNAL, thereby increasing our knowledge of camel diseases. No attempt has been made in this paper to deal with anything but the male working camel from the point of view of the veterinary officer on active service.

Translation.

ON THE USE OF A SO-CALLED METALLIC DRESSING.

By VETERINARY-MAJOR CHAUSSÉE.

Of the 111th French Regiment of Heavy Artillery.

Veterinary surgeons serving at the Front have noted the difficulty, not to say the impossibility, of maintaining dressings in place on the members of animals by the aid of simple linen bandages. This difficulty is chiefly experienced in winter, when the units whose efficiency depends on us are bivouacked on ground completely sodden by rain and transformed into veritable quagmires. In these conditions the linen bandage is insufficient; it is immediately soiled, tears or rots quickly, and needs replacing daily. Even if we have plenty of material, the daily renewal of dressings is not always possible.

To remedy this state of things, I suggest the use of a metallic dressing, easy of application, not costly, and within reach of all. It consists in the use of simple wire-netting of as narrow a mesh

as possible—for example, that which is used to make bird-cages. Its use is quite simple, and the shape to be given to the dressing varies with the region on which it is to be applied, and is left to the appreciation and ingenuity of the practitioner.

For example: Dressing of injuries at the level of the prominences of the breast bone—use a band cut out of the wire-netting of the width of three fingers, and the length of which will allow it to go beyond the prominences to right and left. A wire thread passed into the upper meshes shaping its edge will unite at the extremities of the band of netting with a wire thread passing similarly in the lower meshes. Twist these two threads, which are joined together, with pincers, once the bandage is put in place with those of the other extremity of the band. Make this wire thread immobile by clinching it tightly and embedding it in a groove of the wall made with the help of a rasp or pincers; do not stitch it, but only bend it over.

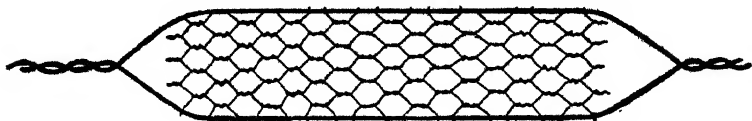


FIG. 1.

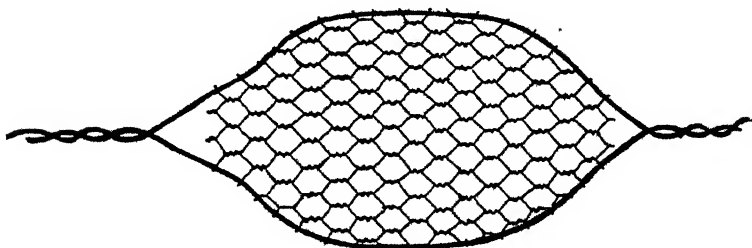


FIG. 2.

The procedure may be carried out quite well without grooving and without pincers by simple clasping of the wire thread to hold this dressing in its place for several days; it suffices if it is examined every morning at visiting time and clasped afresh if occasion requires.

Dressings for Suppurations of the Coronet.—Cut out an oval piece of netting of the required size. The same wire threads previously described, fastened in the same way at the extremities and clasped together with those at the other end, at the point of the wall diametrically opposed to the wound.

Dressing for Necrosis.—Cut out of the netting a rectangular bandage whose dimensions will permit of making a complete surrounding of the member to be treated and reach above the fetlock. Some wire threads as in the preceding dressings above and below the

network. Fix this at the bottom on the toe of the shoe, attach loosely at the top, which is effected by simple closure of the netting.

I have even used the netting in the treatment of wounds of the joints and in broken knees. As I have previously stated, their form and their making are left to the initiative of the veterinary surgeon. They have the advantage of keeping their position for a very long time, and allow of the horse displacing them without risk of soiling the wound and without fear of loss of the bandage.

Metallic bandages are within reach of all. The Engineer Service furnishes netting to the units. The ends of the wire threads, which are cut when making the bandage, should be flattened well, and then there is no fear of wounds being caused to the opposite member to that

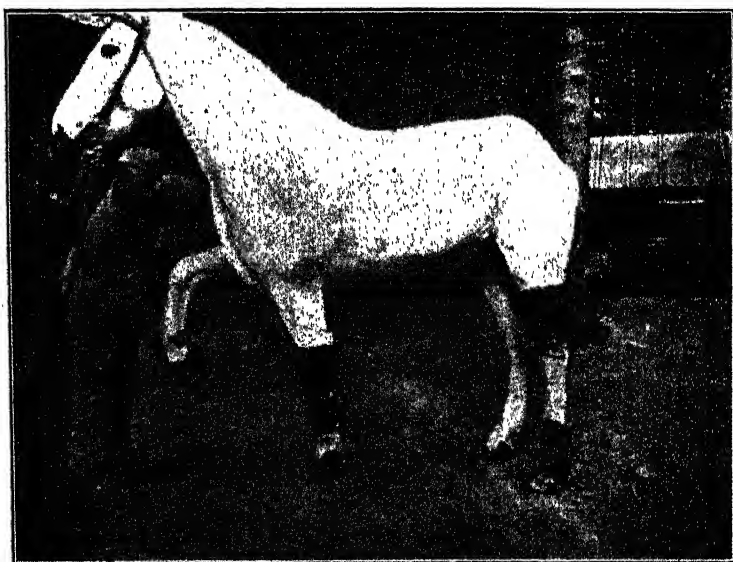


FIG. 3.—Horse with dressing fixed by wire netting.

being treated. The only inconvenience to be ascribed to them is that they necessitate a certain amount of stuffing—that is to say, a considerable quantity of wadding, especially in the case of necrosis or sore heels or other similar conditions. But this difficulty is easily solved. One can replace the wadding for stuffing by the felting used to line the sockets in the boxes for projectiles of large calibre. This felt is thrown away by the shooting batteries when the cases are empty. This wadding of excellent thickness is of great service in the preparation of certain dressings.

By calling attention to the use which can be made of wire-netting as a means of applying wadded dressings, I hope to render a service

to veterinary surgeons who, serving at the Front, have not at their disposition the material which their more favoured colleagues at the rear possess.

The photographs explain the uses of the netting in different regions. Easy of application, simple in their construction, they are very solid, very resistant, and cheap in price.—*Revue Gén. de Méd. Vétérinaire*.

G. M.

Reviews.

TEXT-BOOK OF MEAT HYGIENE, WITH SPECIAL CONSIDERATION OF ANTE-MORTEM AND POST-MORTEM INSPECTION OF FOOD-PRODUCING ANIMALS. By R. Edelman, Ph.D., and John R. Mohler, A.M., V.M.D., and Adolph Eichorn, D.V.S. Third revised English edition and authorised translation revised for America. Pp. 439, 161 illustrations, five coloured plates; price 21s. net. Publishers: Messrs. J. and A. Churchill, 7, Great Marlborough Street, London, W.

Although revised from the point of view of the rules and regulations governing meat inspection of the Bureau of Animal Industry in America, this book contains valuable and quite modern information for all English-speaking meat inspectors. It is well arranged, and in a series of fourteen chapters deals adequately with meat from its source of origin to its stage of consumption, and the care and supervision that must be exercised to ensure a wholesome and good supply. The importance of ante-mortem inspection of animals no less than that of post-mortem inspection of carcasses receives due consideration, and the preparation and inspection of meat food products, which has always been a matter of difficulty to inspectors, has a special chapter to itself. The volume has been brought well up to date with regard to the pathology of various diseases which afflict food-producing animals. Meat poisonings, the hygiene of meat itself, and the cleanliness and construction of abattoirs and stockyards are comprised in a full knowledge of the science of meat inspection, and here we find much that is apt and interesting on the subjects. If meat inspection as an ordinary every-day procedure in all large towns and cities advanced as much as the knowledge of its technique progresses, we might be satisfied with the position, but there is a huge kingdom to bring under supervision before the science can produce its best effects. Wherever meat inspection is carried out regularly, this book for reference and study will be very welcome, and it may accomplish some pioneer work in calling attention to the necessity of the work as a safeguard to the health and hygiene of all progressive communities.

G. M.

Department of Agriculture and Technical Instruction for Ireland—
SIXTEENTH ANNUAL GENERAL REPORT OF THE DEPARTMENT,
1915-1916. Published by His Majesty's Stationery Office,
Dublin. Price 1s. net.

The report is a record of lively activity in matters that conduce to healthy and remunerative progress in agriculture. £10,000 was provided for horse-breeding under the Department's scheme; the registration of dairy cattle, the formation of cow-testing associations,

the improvement in the breeds of swine, sheep, and poultry all occupied the earnest consideration of the Department. The importance of increasing the food supply was constantly put before the agriculturist by a wide issue of posters and special leaflets, and the instructors and overseers paid particular attention to the increase of food products. The Veterinary Division conducted research and advanced knowledge in connection with the following diseases: Braxy, louping-ill, pyæmia in lambs, contagious abortion and tuberculosis in cattle and diseases of poultry.

The report is altogether an admirable document and we think we can see in it one factor, and that by no means a trifling one, contributing to the marked and continued prosperity of Ireland as an agricultural country. Every one of its pages is instinct with life and breathes the spirit of true progress.

G. M.

Obituary.

LIEUTENANT HOWARD S. TINDALL.

Members of the profession will hear with deep regret of the death in action in Flanders of Lieutenant Howard S. Tindall, the junior partner in the well-known Veterinary publishing firm of Baillière, Tindall, and Cox, whose name has been so closely associated with the Veterinary world from the student days when we purchased our first veterinary text-book. Born in 1884, Mr. Tindall was educated at Haileybury and Pembroke College, Cambridge, graduating B.A. with honours in 1907.

Shortly after the war started he joined the Inns of Court O.T.C., and obtained a Commission in the Royal Berkshire Regiment, holding the position of Brigade Bombing Officer, and then that of Brigade Signalling Officer. His quiet, genuine manner had gained him many friends, by whom his death is much deplored, and our deepest sympathy is extended to his father and brother.

NOTICES.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Gerrard 4646. Telegrams: "Baillière-Rand, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

Manuscript—preferably typewritten—should be on one side only of paper, marked with full name of author.

Illustrations for reproduction should be in good black or dark brown ink on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox.

Annual Subscription for the British Empire, 12s., post free; for the United States \$3.00; or combined subscription with the "Veterinary News" (weekly), 25s., post free. Owing to increased cost of production the "Veterinary News" has been from July increased to 3d. per copy; annual subscription, post free, 15s. inland and abroad.



THE LATE CAPTAIN ALFRED HOSKIN, F.R.C.V.S.
(Army Veterinary Corps).

THE VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.,

HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING;

MAJOR IN THE ARMY VETERINARY CORPS.

HONORARY MEMBER OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.

CORRESPONDANT ÉTRANGER DE LA SOCIÉTÉ DE MÉDECINE VÉTÉRINAIRE DU
BRABANT (BELGIUM)

Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

OCTOBER, 1917.

Editorial.

OBSERVATION AND DRUGS.

“ Two men look out through the same bars :

One sees the mud, and one the stars.”

“ Some men go through a forest and see no firewood.”

KEEN observation is undoubtedly one of the most precious faculties a veterinarian can possess. To be of benefit, however, it must be of the trained order, and akin to that of the housewife who can extract information from an examination of the grain of meat or the breast and legs of a chicken. It is no good looking at things or noting incidents if we cannot gather information from the observation. Some men can see more at a glance and know better what they are looking for, than others who carry out prolonged observations but do not possess a very discerning mind. There is, perhaps, no science hitherto so inexact as that dealing with the uses of drugs. It seems to be a sign of modernity to look askance at any benefit to be derived from them. Few are the men, however, that do not employ them. We think that the views held as regards the action of many drugs need revising in the light of our knowledge of physiology and histology. How can it be expected that drugs given by the mouth can exert much action locally in cases where great tissue changes have taken place in muscle, tendon or bone? Yet in joint-ill, pyæmia and septicæmia we continue to give them. The real therapeutic effect of drugs can best be ascertained by noting and recording their healing action in hundreds of cases, and in this connection much valuable information is now being gathered in this war. There never was a time when opportunity knocked more persistently at the door.

Epizootic lymphangitis, erosive stomatitis and mange have been largely dealt with in France, and material has been gathered to show pretty conclusively how far drugs and their compounds assist in the cure of these diseases.

The man who dispenses with the aid of drugs to reduce temperature will have complications and long cases. Where fever arises in lung troubles and laminitis, we think records are plentiful enough to show that their use is very valuable. At any rate we should not like to discard sodium hyposulphite, pot. int., and acetanilid from our list. In some cases of stomatitis in various animals sodium hyposulphite is invaluable. We believe that the proper way to look at impaction of the rumen in cattle is to regard it as due to paralysis of the stomachs, and from records gathered in about 1,000 cases it is proved that the withholding of solid food for days, and treatment by drenching with linseed mucilage in which alternate doses of arecolin and veratrin are dissolved produces very good results, and is the best that can be given.

So as time goes on and proper and plentiful observations can be made, we are hopeful that the science of therapeutics as concerned with drugs will become more exact and that we shall know that the middle way between their invariable use and their total rejection is the right and scientific one.

G. M

Original Communications.

THE ORIGIN OF THE SO-CALLED "FORKS" IN BAGS OF OATS.

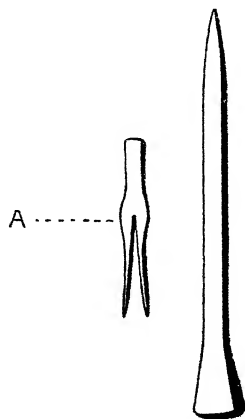
BY MAJOR FREDERICK HOBDAY.
Army Veterinary Corps.

SOME little time ago the daily Press had articles in it reflecting on the malicious efforts of the Germans to injure the horses of the British Army by the insertion amongst the oats of a number of so-called "steel forks."

Casual observers, upon reading these articles, could not help but gain the impression that these pieces of steel had been specially manufactured for the purpose, and that they had been placed amongst the oats with the evil intent that the horse should swallow them; the hoped-for result being that they would penetrate the bowel and give rise to enteritis and subsequent peritonitis.

As the ends of the prongs are very sharp, this is a contingency which might perhaps happen, although a much more likely result would be the eventual formation of a calculus, the metal acting as a foreign body in the usual way in which a piece of metal does. The

chief point worthy of notice is that, although, of course, there are grounds for the surmise that the "forks" were put there maliciously, this does not necessarily follow; nor were they necessarily made for that purpose, as almost every horseshoe nail box contains a number



MACHINE MADE HORSE SHOE NAIL.

A. The end of the nail after it has been stamped out.

of these (in one we counted no less than 13), and it is quite conceivable that if oats and horseshoe nails travelled by the same transport, they might get intermingled. The sketch herewith is made from an actual specimen taken from a horseshoe nail box.

AN ENQUIRY INTO THE HORSE DISEASE KNOWN AS SEPTIC OR CONTAGIOUS PNEUMONIA.

BY LIEUT.-COL. H. WATKINS-PITCHFORD, F.R.C.V.S., F.R.S.E.,
Army Veterinary Corps.

(1) THE writer feels, in putting forward the views contained in this report, he has attempted the construction of a theory upon hazardingly meagre data, and that the clinical material afforded by the Swaythling Remount Depot and Veterinary Hospital bears but a small proportion to the sum of material available elsewhere.

INTRODUCTION.

While diffidence is expressed therefore in suggesting the application of the findings of this report to pneumonic conditions generally throughout the Service, the fact is at the same time recognised that such cases as have come under review at Swaythling have been drawn from all parts of the United Kingdom, and may therefore be considered as representative of, and applicable to, generally existing conditions. It is further hoped it will be remembered that the need for the furnishing of this report at an earlier date than originally

intended has necessitated the deferring of several lines of the enquiry besides a recapitulation of certain details which it was hoped to include within the allotted twelve months originally set down for the work. The past eight months available to the investigation have, in addition, been very fully occupied, apart from research work, in the routine veterinary administration duties of a large Remount Depôt, a fact which, not unnaturally, has been much in restriction of progress.

PREVIOUS OBSERVATIONS.

(2) In the brief report furnished in September, 1915, attention was drawn to certain details in connection with the above disease. The conclusions arrived at—which were only of a tentative and preliminary nature—were based upon observation of the disease as it was found to exist in the Swaythling Remount Depôt, and such observations were confined merely to the aetiology or causes concerned with the origin and spread of the disease in the Depôt in question.

(3) Reference to that report shows that no evidence was then forthcoming as to the directly infectious nature of the disease from horse to horse, and the report further aimed at demonstrating the existence of a lengthy and indefinite period of incubation or latency existing between infection and obvious lung involvement. Extended and adequate observations—such as are necessary in dealing with a question of this nature—have naturally not been possible, inasmuch as the rapid passage of animals through, and their clearance from, the Depôt has rendered impossible any attempt at continuity of observation over an extended period. It may be said, however, that since the furnishing of the report alluded to, nothing has been found to conflict with the impressions therein recorded as to the absence of a direct infective agent acting within a definite period of time. Such negative conclusion appears to be endorsed by all who have had practical experience, either on land or during sea transport, in dealing with the disease. This at least is the impression left upon the writer's mind after enquiries from persons of experience whose views he has been able to ascertain.

(4) Further, the report in question showed that the factor of a seasonal incidence existed, although it was recognised that the indications on this point available from a single Remount Depôt were open to the objection of insufficiency of data upon which to establish such conclusion.

(5) The writer is unaware whether the records of this disease at headquarters will support this view of a seasonal incidence, but he thinks they probably will be found to do so, and such evidence, if it exists, will not be devoid of significance in the present endeavour

to find a solution of some of the hitherto obscure points connected with the ætiology of the disease in question.

INFECTIVITY.

(6) Clinical observation and experimental test have both tended to show the non-infectious nature of the disease. Such negative conclusion has not been arrived at hastily, for it involves the necessity of otherwise accounting for the wide prevalence of the disease. No experimental evidence can here be cited supporting the theory of a direct transimission under normal circumstances from animal to animal; close contact during all stages of the disease having proved negative in results.

THE DISEASE NON-INFECTIOUS.

(7) The name of "Specific" or "Contagious" Pneumonia, both of which terms are frequently applied to the disease, appear to the writer as misnomers, and there also seems evidence leading to the conclusion that the term "Septic" is equally inapt as a designation of the disease if used in a specific sense.

(8) Recent observations, indeed, suggest the classification of the disease as one of an idiopathic rather than a specific nature, or, perhaps, a standing midway between the two categories, being due to the agency of an organism occasionally present in, but non-pathogenic to, the normal horse, and assuming a pathogenic phase under conditions of lowered vitality in the host which harbours it.*

(9) Amongst the several points leading one to a conclusion as to the non-infectious nature of the disease is the frequency with which ordinary catarrhal conditions precede cases which ultimately terminate fatally with gangrenous condition of the lung—typical cases of so-called septic pneumonia. All such cases as have come within the present observations have furnished a history of previous or existing catarrh. In several cases coming under notice, there has existed the history of an antecedent catarrhal attack some months prior to the pneumonic involvement. Such records are naturally rare in the circumstances afforded at Swaythling, inasmuch as convalescent catarrh cases are reissued as soon as fit, and are so lost sight of, it being only by accident that delay occurs in issue and a case is recognised as having been the subject of previous treatment for catarrh.

(10) This frequency with which, in pneumonia cases, a history of

*A somewhat parallel instance would be afforded by Fränkel's *Pneumobacillus*, a frequent inhabitant of the normal upper air passages, assuming its specific pathogenic phase only as reduced vitality in the tissues of the host permits establishment and generalisation.

past catarrhal attack is recorded or can be observed directly to precede and merge into a condition of pulmonary involvement, has shown the impossibility of ignoring the primary catarrhal phase in attempting a solution of the septic pneumonia problem.

(11) It is not suggested that every case of so-called septic pneumonia is preceded by a definite involvement of the Schneiderian membrane (such as constitutes the ordinary "catarrh"), though such history will be able to be traced in the great majority of cases.

(12) Having in regard the limitations expressed in para. 1, the writer ventures the opinion that the primary and essential condition leading to the development of this disease is one of impaired vitality of the lining membrane of the respiratory tract, and that this lowered vitality permits the lodgment within the membrane of an organism—in this sense a specific organism referred to subsequently as the " α " bacillus—which organism must be held responsible for the train of clinical and *post-mortem* phenomena which go to make up the disease known as specific or septic pneumonia. It is not necessary to recall that such lowered vitality of the respiratory membrane may arise from causes other than those of a specific nature. Cold, exposure, overwork, or even dietetic errors (such as may determine the congestion of the laminae of the horse's foot) are all potential factors in establishing conditions leading to congestive states. Of the above causes, exposure and a state of reduced vitality consequent upon food shortage, are probably the chief causes operating in the production of the early stages of congestion necessary to the development of the disease in question.*

However arising, the writer considers this condition of congestion and stasis the first and essential step towards the development of more specific conditions, and up to this point the pathology of the disease is that of the ordinary sporadic form of pneumonia.

CONNECTION OF CATARRH AND PNEUMONIA.

(13) The cough—so frequently a symptom of the ordinary catarrhal attack—and the lung embarrassment consequent upon exercise during such attack, point to the existence of a degree of

*A single typical example will suffice to illustrate the point. On February 9th, 32 H.D. horses were despatched to this depot from C———. They had been recently clipped, but wore rugs, and were twenty-seven hours upon the journey; 10° of frost was registered during the night. Upon arrival at Swaythling eight of these horses were showing a nasal defluxion, and within seven days twenty-four of the twenty-five were either in hospital or upon depot sick lines suffering from an attack of nasal catarrh of marked severity, with elevated temperature. The blood of six of these horses was examined and in each case the organism described below was obtained in pure culture from the circulation. Ten of these horses have already succumbed to pneumonia, a septic condition of lung being present in some instances.

pulmonary congestion as usually accompanying catarrh. Such theory is borne out by the absence of any well-marked clinical feature separating the two conditions of so-called "catarrh" and pneumonia, the one state merging into the other by progressive and ill-defined stages.

SAME CAUSAL AGENT.

(14) The writer wishes to emphasise the difference as one of degree rather than of kind, inasmuch as in both conditions repeated observation has shown the probability of *the same causal factor* being concerned, directly or indirectly.

ORGANISM IN THE CIRCULATION.

(15) The organism in question has been found in 57 per cent. of cases in the circulation of the living animal when suffering from catarrh, and obtainable in pure culture from the blood of the same.

(16) The same bacillus can be shown to exist in an even increased percentage in the blood of horses, the subject of pneumonia, and also its presence in the various tissues after death.

(17) That this same organism is present occasionally in the circulating blood of horses not the subject of any catarrhal condition and apparently in normal health, was proved in the course of the investigation.

(18) There is no evidence, so far as the writer knows, to support the theory that the normal circulating blood may harbour indefinitely an organism of the type in question. Such a conception would be at variance with our views as the bactericidal character of the blood and of the intolerance of its cells to the presence of any foreign particulate matter whether organic or inorganic.

THE ORGANISM PATHOGENIC.

(19) The presence of bacteria in the blood-stream is recognised in several diseases during attack and convalescence, but always as an abnormal and temporary phenomenon, and as a sequel to an infective process. As far as we know, the bacteriolytic action of the blood is exerted upon non-pathogenic organisms at least as readily as upon those of pathogenic type, which latter indeed are often capable of exerting a resistive or repellent action (negative chemiotaxis) towards the white blood cell, tending to maintain their presence in the circulation.

(20) The existence therefore of the bacillus "*x*" in the circulating blood of the apparently normal horse is no evidence as to its non-pathogenic or harmless nature, and its occasional presence there

must be looked upon as a pathogenic phenomenon, even though at times no gross clinical reaction exists.*

(21) While the theory as to the non-pathogenic and normal nature of this organism in the blood is without support and against probability, the converse evidence as to its pathogenic nature is too weighty to be disregarded. Its occurrence in the circulation of the majority of cases of catarrh, its almost invariable presence in the circulating blood or organs of pneumonia cases, its association with pyrexial conditions and, not least, the agglutination phenomenon—which is so marked a connecting link between any given pathogenic organism and the disease produced by its agency—all these facts appear to the writer to constitute the strongest presumptive evidence as to the essential nature of this organism in the production of the disease.

(22) The presence of agglutinins in the blood of the horse suffering from, or recovered from, catarrh, is demonstrable to a marked degree, and exerted, so far as the writer has observed, only towards the specific organism in question. No other organism indeed has been so constant in its presence, either in the circulating blood or in the tissues, as to warrant any conclusion as to its essential association with either catarrh or pneumonia. Examination of the blood of fifteen of the 100 cases of catarrh showed other varying organisms, and, as a passing observation, it is interesting to note that a bacterial invasion of the blood-stream was thus shown to exist in 72 per cent. of the cases examined—i.e., that only in 28 per cent. was it found to be in a sterile condition.†

(23) The degree to which the agglutinative principles exist in the blood of different horses varies considerably. This is as one would expect in view of the prevalence of the organism and the impossibility, in existing circumstances, of tracing antecedent attacks of catarrh in the horse, such as are probably the chief cause of the agglutination phenomenon. That this agglutinative power is not entirely dependent upon previous catarrhal attack, however, would

*The ordinary "bacillus carrier" of the meningo-coccus or diphtheria organism would afford a parallel in the human subject where, without disturbance of the health of the host, a pathogenic organism is harboured indefinitely and later is able to re-establish its pathogenic effects when transferred to a susceptible subject. The bacilluria of the Enteric convalescent provides, perhaps, a closer analogy, inasmuch as the causal organism appears to maintain its existence in the blood-current itself for lengthy periods without re-exerting its pathogenic effects or interfering with the health of its host.

†This high percentage was only secured when the medium used was composed of, or made with the use of, horse flesh or serum in place of the usual beef cultivation media. The percentages given above are indeed capable of expansion inasmuch as the earlier estimations made upon media, from which the element of horse flesh was absent, and as such gave a lower figure.

seem probable from the agglutination of the normal ox and sheep, which, though not high, is definitely present. Such difference between the horse and the ox would appear likely to be due to the presence in the tissues of the former of some substance of a bio-chemical nature, permitting the more vigorous development of the organism in question. The *in vitro* experiment mentioned above (footnote para. 22) when dealing with cultural differences would appear to bear this out. (See also appendix, "Technique," 2.)

(24) It is further possible that this agglutinative power of the blood in the equine is of gradual accession and consequent upon recurring invasions of the blood-stream and tissues by the organism in question, invasions so slight as to evoke hardly any noticeable systemic reaction or condition of malaise. Evidence is accumulating to show that the unexpected thermic reaction occurring amongst the horses passing through Swaythling Dépôt, mentioned in the writer's first interim report, is due either to this cause or is of the nature of a temporary lapse in the immunity of the horse towards the organism in question. More work, however, is necessary before speaking decisively upon this point.*

(25) Reference to the table mentioned above shows that the agglutinative principle is absent from the young equine or only present to a modified degree. The observations in question were made upon young carthorses and foals, and as this heavy class of horse is elsewhere shown to be particularly susceptible both to catarrhal attacks and pneumonic involvement, this absence may be held to apply *a fortiori* to the lighter classes of young horse.

(26) It is a feature of significance in considering the agglutination of the horse's blood towards the bacillus in question that the phenomenon is not only rapidly established by an attack of catarrh or by the introduction of the bacillus itself into the horse's system, but that it follows rapidly, and to a pronounced degree, upon the introduction into a normal horse of the blood of a catarrhal case, even though in the latter the existence of the bacillus cannot be demonstrated by cultural methods. The link in the evidence serving to connect the catarrhal attack with this organism as its specific cause is thus greatly strengthened.

(27) Not only is the agglutination index of a horse, which previously stood at zero, raised by the introduction of a small quantity of such

*In consequence of this observation it will be remembered that general instructions were issued from Headquarters making the recording of temperatures before issue a routine procedure. From the twelve months subsequent records of such cases of "temperature rejections"—at least so far as they apply to the Swaythling Depot—it would appear that this precautionary measure has been abundantly justified, and an average throughout the year of about 1.75 per cent. of all horses for issue have been withheld on this account.

catarrhal blood, but the figure to which it is raised may exceed the index figure of the horse furnishing the blood, a result which negatives the attempt to explain the phenomenon upon the ground of a mechanical transference of agglutinins from one animal to another, and furnishes additional evidence of the strictly specific character of the reaction.

(28) Several obscure points remain to be elucidated in connection with this agglutination reaction of the horse, which points, among many others, the writer had hoped to clear up before submitting his report, but the necessity for furnishing the same at an earlier date than expected has perforce left such work still in abeyance.

It seems, however, that the agglutination reaction in question is as specific and selective as Vidal's Agglutination Test for Enteric, and that it furnishes as reliable an index of a specific bacterial invasion as that test affords.

(29) The foregoing paragraphs are thus summarised.

- (a) The great majority of cases of specific pneumonia are preceded by an involvement of the nasal membrane, constituting the condition known as "catarrh."
- (b) Such antecedent condition of catarrh is induced by depleting physical conditions and not by direct transference of infection from horse to horse.
- (c) Throughout the clinical course of such cases a specific organism is present probably in all, but certainly in the majority of instances, both in the circulating blood and in tissues after death.
- (d) The blood of animals suffering or recovered from either of these diseases acquires a specific property capable of clumping or agglutinating strongly the bacillus in question.

The conclusion drawn is that an essential connection exists between the ordinary catarrhal and pneumonic attack and the organism, which latter, though usually non-pathogenic to the normal horse, is capable, in circumstances of lowered vitality, of establishing a pathogenic action ultimately leading to grave tissue involvement. The manner in which the morbid action is established is dealt with in the immediately succeeding paragraphs.

PATHOLOGY.

(30) The early stages of a typical case of septic pneumonia will always furnish a history of a definite pyrexial period generally consequent upon exposure to cold or exhaustion, or a change of environment, such as removal to or from warm or ill-ventilated stables. In the great majority of cases a defluxion from the nose with or without loss of appetite leads to the detection of an elevation of temperature.

Over 60 per cent. of such temperature and catarrh cases will show the presence in their blood of the "x" bacillus, and this percentage will be much increased if a second examination of the blood is made in those cases which have failed to show the bacillus at the first abstraction. The organism will be found in nearly every case to be in pure culture, and direct microscopic observation of the blood will show that it also may exist in the blood-stream in the fully-developed, and, which is more remarkable, in the sporing condition, as well as in the resting stage. (v. photo-micro No. 1.)

(31) Absence of exercise at this phase of the disease will lead to subsidence of temperature though the defluxion may persist. Some cases, however, after temperature fluctuation, "go off their feed," the respiratory rhythm becomes accelerated to 18 or 20 per minute or more, and if failure to detect these abnormal conditions leads to exercise or exertion, symptoms of grave lung involvement, and the ordinary form of pneumonia ensues with hyperpyrexia and frequent involvement of the pleural surfaces. Bacteriological observations if repeated will continue to show the organism present in the circulation.

(32) The root of the lungs and anterior lobes appear to be involved primarily in the rapid consolidation which follows, and the development of a network of fibrinous lymph on the surface of the pericardium and diaphragm is a frequent condition, such network or layer assuming at times great thickness and consistency, though without evidence of organising. Inoculation made from the pleural or pericardial surface, exposed by dissecting off a portion of this membrane, will almost invariably give a pure culture of the bacillus in question. This fibrinous exudate may involve both surfaces of the main lobes, with, of course, the corresponding costal pleuræ, and the chest cavity may contain varying quantities (up to 25 litres) of turbid flaky lymph of varying, but generally low, specific gravity (average 1.025). Where such exudative changes have occurred, the pleural surface covering the lung frequently attains a considerable degree of thickness, in the main, apparently by deposition on the free thoracic surface, but also to some extent—and possibly primarily—from the throwing out of a plastic exudate under the pleural covering of the lung, this being apparently an extension of the same process involving the interlobular septæ, which latter map out the affected area in an arborescent manner.

(33) Here again dissection of the pleural membrane and inoculation from the sublying exudate on the surface of the lung will generally show by inoculation the "x" bacillus in pure culture, even if examination of smears made direct from the exposed surface fail to show its presence.

(34) The involvement of the lung tissue itself over the regions previously mentioned, often takes place without involvement of the pleural surface or exudative changes. Advanced tissue changes are often apparent in the substance of the lung without involvement of its pleural surface. These changes appear to conform closely with the usual morbid appearances of sporadic or idiopathic pneumonia. All stages from a primary congestion to a breaking down of the grey hepatised areas are present, and in all these changes the presence of the same organism can usually be demonstrated. Photo-micro 6 shows an impression smear made from a small area commencing to caseate.

THE "SEPTIC" CONDITION.

(35) It is noteworthy that an advanced condition of hepatisation, and even breaking down of tissue, may be reached without any suggestion of the pneumonic process assuming a "septic" condition. As the disease-phase advances, however, the liability on the part of the devitalised lung areas to become invaded by organisms of a septic or other type naturally increases. Such septic invasion may---and frequently does---arise early in the congestive stage; but it appears always to be of the nature of a secondary invasion due to a septic environment, such as most stabled horses are liable to. Recognition of this fact obviously furnishes the *rationale* underlying the open-air treatment of pneumonia, where an increased opportunity for oxygenation and freedom from septic environment often prevents the grave condition which ensues in cases where the tissue of the lung becomes septic.

(36) Even in the advanced septic state the bacillus, which appears to be the primary causal organism, can be isolated without difficulty, owing to its great resistance to a degree of temperature which kills other organisms.

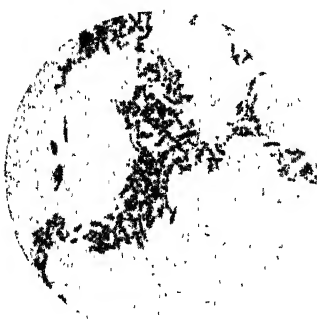
(37) The foregoing sketch of the pathology of the disease is much briefer and less adequate than the writer had hoped to have put forward; but considerations of time have much curtailed all the present observations. It only remains to record that the lining membrane both of the heart and gastro-intestinal tract appear to be involved in the bacterial invasion. The heart is frequently ecchymosed and blotched in the left ventricle, particularly during the more acute phases of the disease. In such cases, dissection of the endothelial lining and inoculation from the hæmorrhagic heart-muscle lying directly beneath, will generally furnish a pure culture of " α " bacillus. In none of the cases coming within the notice of the writer has the serous covering of the heart been involved on its internal or cardiac surface, nor has any excess of fluid been noticed in the *pericardial sac*.



1



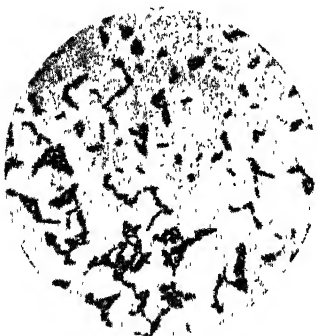
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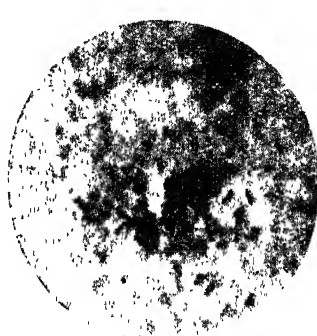
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5



3



6

PHOTO-MICROGRAPHS OF BACILLUS DESCRIBED IN REPORT.

- PHOTOMICRO No. 1.—A blood-film. Shows organism circulating in the blood of a horse. Some of the bacilli are observed to be in a sporing condition.
- " No. 2.—Longer form of same organism from an agar culture. The organism is sporing freely.
- " No. 3.—A young culture showing organism in rod form, not sporing.
- " No. 4.—Showing polymorphism of the organism, which occasionally assumes the coccal and diplo-coccal form shown here.
- " No. 5.—From a serum culture showing degenerate mycelial form of extreme age. Both this form and that shown in No. 4 become vigorous growths of normal type re-transplanted.
- No. 6.—A smear from caseous lung showing a group of "x" bacilli amidst broken-down cells.

(38) The stomach and intestines appear in acuter cases to participate in the bacterial invasion. The mucosa of the former is frequently intensely injected, as is also the small gut and cæcum, particularly towards its closed end. Here, again, dissection, with aseptic precautions, of the mucous covering of the injected area will permit the organism to be isolated from the layers of the sub-mucosa, or the summits of the inflamed rugæ.

(39) Other organisms, particularly in advanced and septic cases, are met with, but so far as the writer has observed, none with such constant recurrence as to suggest other than an accidental and non-essential association with the disease under consideration.

(40) The pathological and clinical picture may therefore be briefly sketched as follows:—

Exposure, hunger, or other devitalising influences* lower the resistance of the respiratory tissues of the host, making possible the establishment of a bacterial invasion of the nasal and bronchial mucous membrane. The primary lesion is generally to be found in the Schneiderian membrane, or turbinated bones, which, besides being more exposed to temperature variations, form the channel through which any organism entering the pulmonary system must pass. The organism itself is widely spread, and evidence accumulates to show that, in common with disease-producing organisms, its degree of pathogenicity may become enhanced. As the paragraphs on its bacteriology show, the bacillus is strongly, though not entirely, aerobic, so that the exertion of its morbid effects upon the air passages is to be expected (a fact which would explain the absence of gross lesions in the other organs in which the bacillus is shown to exist).

(41) Congestion of lung tissue, whether arising from cold or from any of the other recognised causes, especially enforced exercise during temperature disturbance, is attended by embolism and occlusion,† and by the lodgment of the organism in the ultimate air passages

*The close atmosphere of the crowded or closed stable or the lower decks of horse-transports would appear to come within this category of devitalising causes, such effect being exerted upon the nasal and bronchial membrane, possibly through the presence of the high percentage of free ammonia in the respired air. It will be remembered that a horse contracts catarrh, etc., when brought from grass into a warm stable more frequently than when turned out from the latter to open-air conditions, however inclement these latter may be.

†The embolic occlusion of air vesicles and bronchioles would be explained from the cultural characteristics of the bacillus (q.v.). When growing under aerobic conditions the organisms forms a pellicle or skin of much tenacity or toughness such as would tend to the establishment of colonies or aggregation of bacterial bodies wherever the organism effected a lodgment. The production of infarcts in this manner is readily understood. A tendency to formation of a pellicle or tough aggregation does not exist on media made from the flesh of the ox, and such point may possibly serve to some extent to explain the absence of liability in the latter to lung involvement.

where the *optimum* conditions of warmth, stillness, and an adequate supply of oxygen ensure its vigorous proliferation, the restraining cellular influences exerted by a normal membrane having been impaired or abolished through the vascular congestion of the area involved.

Reference to the bacteriology of the organism shows that it is capable of exerting a proteolytic or tissue digestive influence, and, further, that it is capable of exerting such an effect under conditions where the supply of oxygen is almost entirely cut off—conditions, in fact, such as would exist in a hepatised or necrotic area. This observation supplies a link necessary to complete the pathological process, and to account for the extensive tracts of non-septic, broken-down, and disintegrated tissue which form so conspicuous a feature in the necropsy of an advanced and uncomplicated case of the disease. Where outside septic organisms are implanted upon a lung in this devitalised state, as is generally the case, the condition hitherto styled specific or septic pneumonia results, and the absorption of septic products causes in many cases a critical diarrhoea which hastens the termination of the case.

(42) The existence of an offensive smell in the breath of a pneumonia case with nasal discharge is not always a reliable index as to a septic condition of the lungs themselves. The breath may be offensive during life and the lungs subsequently found to be free from septic infection. Extension of the septic process of the lung has in several cases seemed to take place from the ozæna or foetid discharge hanging about the anterior nares. It has been a frequent observation, also, that considerable areas of lung tissue may—*post-mortem*—be found to be in a septic state, whereas during life no foetor of the breath could be detected.

(43) So far, therefore, as the writer has been able to determine from evidence afforded at Swaythling, septic pneumonia, as a disease *sui generis*, does not exist.

BACTERIOLOGY.

(44) The organism in the foregoing paragraphs referred to as bacillus "x" has been so styled because, though closely resembling the *B. subtilis* of the text-books, it has certain points of difference in morphology and culture which do not conform to those of the Hay bacillus. The resemblance, however, is very close, and the organism is probably one of a nearly allied group or, perhaps, a strain of the *B. subtilis*. No time, however, has been afforded for the determination of any exact classification, nor has it seemed that such academic point is of importance to the aim of the present effort.

(45) The *B. subtilis* has always been regarded as an essentially

non-pathogenic organism, so far as the writer—who has no adequate works of reference at hand—can recall. Its appearance, therefore, as an organism frequently present and actually sporing in the bloodstream, strongly evoking the formation of anti-bodies, and setting up morbid changes in the tissues of the horse—such facts call for an alteration of our previous opinion, unless indeed subsequent observations, by showing that the organism in question is not a form of *B. subtilis*, remove the charge of pathogenicity from the latter.

(46) Nor can it be recalled that proteolytic properties have in the past been attributed to this bacillus, though the possession of such is of importance in the present connection.

(47) Reference to photo-micrographs (Appendix B) will serve to show the forms assumed by this organism under varying conditions of culture, etc. Details of motility, spore-production, chromatism, etc., etc., have been observed as far as possible, but the greater part of such observations are not completed or cannot be tabulated in time to embody in a report already twice called for. The same holds good of a considerable mass of observations on the blood and the variations in its cellular content, etc., data which may be available to some future worker at the same disease problem.

(48) The data afforded by the present work are not sufficiently adequate to warrant the assumption that the bacillus dealt with is the causal organism in all cases either of catarrh or pneumonia; or, indeed, that it is solely concerned in the production of the cases reviewed. Other organisms may conceivably exist as causal factors in other forms of pneumonia while ultra-microscopic germs may have been present in the cases reviewed. All that can be said at the present stage of the work is, that no evidence of the constant association of other forms of bacterial life has been forthcoming either microscopically or by cultural method, while obvious and repeated evidence exists as to the very frequent association of an organism whose presence has hitherto remained unsuspected.

PROPHYLAXIS.

(49) The writer has throughout this enquiry borne in mind that the devising of measures of protection is the direct object to be attained. To have devoted the short available time to empirical experiment in the hope of devising some short cut to protection without basing the same on a scientific survey of the nature of the disease, and the manner of its protection and spread, would have proved a policy—always inviting to the scientific tyro—but inevitably resulting in waste time, means, and effort. From a long-standing recognition of this fact, the writer has no results of experimental protective measures ready to submit, nor, indeed, have facilities for

the same been afforded other than on an entirely inadequate scale. The observations herein recorded, however, appear to constitute grounds for considering that the condition both of catarrh and pneumonia may possibly be made amenable to preventive treatment. The possibility of achieving so far-reaching a result is not entertained lightly or expressed without diffidence, for, from a somewhat extended experience, a full recognition is entertained of the difficulties attending the devising of practical preventive measures.

FUTURE WORK.

(50) While it is impossible to forecast the result of further investigation, the writer is confident in submitting the opinion that the recent work is too significant and the subject of too weighty a nature to be abandoned without a further effort of a more comprehensive nature. He is led to express this opinion by observing amongst other things the readiness with which the system of the horse reacts to contact with the organism which is the apparent specific cause of the disease in question.

(51) Any future work should, the writer submits, be conducted upon lines sufficiently adequate to permit of the findings of such work being applied generally, and wherever the disease conditions are found to exist. For this purpose, a much more adequate survey of the problem is necessary than is afforded under the present conditions of the investigations at Swaythling, where the work—limited in its scope—is attempted to be carried on under local conditions by an observer whose main duties lie in another direction. No greatly increased expense would attend a future wider effort; but it appears essential that facilities in a broad and ample sense should be afforded if the prospect which the foregoing observations seem to open is to be realised.

(52) The writer, in submitting this report, again regrets the hasty and immature nature of the work, and can only hope that it may be deemed of some use as a progress report marking an extension of our knowledge concerning the diseases in question.

THE TRANSMISSION OF THE DISEASE.

Transference by contact, both of pneumonia and the ordinary form of catarrh, appears to fail.

On several occasions, comprising together some fifty instances, an endeavour was made to transfer the catarrhal and incipient pneumonia condition to the healthy horses by prolonged contact with cases on squadron lines.

To render such contact as close as possible, nosebags were kept upon horses with profuse nasal discharge and high temperature, and

these nosebags were then used to contain the feeds given to the test horses. This procedure was adopted for several days in each case ; but, with the exception of one dubious case of nasal discharge, the horses remained free from catarrhal or temperature disturbance.

The endeavour was also made to communicate more advanced forms of pneumonia, both by close co-habitation and by the more direct methods of blood transference.

Such endeavours, briefly summarised, showed that the lighter class of horse possesses a considerable degree of immunity as compared with the heavy draught type. This is also apparent from an observation of the following figures showing horses entering the Swaythling Depôt for the last nine months.

During the period June, 1916, to February, 1917, inclusive, 53,562 animals entered the Depôt. This number comprised 2,997 heavy draught horses. The percentage of heavy draught horses sent to hospital was 20·12 per cent., and of other all riding classes only 9·63 per cent. Of the total number of heavy horses evacuated (603) 67·4 per cent., or considerably more than half, were catarrh and pneumonia cases.

This statistical evidence, therefore, also tends to show the greater liability of the heavy horse. It is not easy to determine wherein this increased susceptibility lies. Hitherto it has been generally held that the conditions of environment and feeding of the draught horse are responsible for an increased liability to catarrh and pneumonia. The writer thinks, however, that the cause will be found to be deeper, and to be one of an inherent or racial nature, and he is led to this conclusion by observing the resistance to experimental infection shown by the lighter types of riding horse—a resistance which appears to be exerted against both the organism and the infectious blood itself.

The reactions following the introduction of the organism are varying in their time of onset, although a prompt response seems always to take place in the agglutinin content of the blood, which reaction seems to bear little or no relation to the thermic reaction, but rises promptly on the introduction of the bacillus or of infectious blood, frequently falls during the temperature curve, and again rises on the subsidence of the latter to a more or less permanent level. Generally, though not always, a fatal issue is preceded by the rapid fall of the agglutinin in index to zero or thereabouts.

The data available are too meagre to attempt any interpretation of these phenomena—often seemingly in conflict—and further observations are necessary before any significance can be attached to the same.

In the lighter type of horse, inoculation frequently fails to evoke

thermal reaction, and this latter is often delayed until about the tenth day, or even longer, and is then slighter in its incidence. There may be a secondary reaction and the reappearance of the bacillus in the circulation unexpectedly and without exciting cause four months after the original reaction. Work is at present in progress tending to identify such unexpected secondary reactions with the reactions called attention to in the first interim report as occurring—without apparent cause—amongst the horses of the Swaythling Depôt. It is probable that the causal factor concerned in these cases will be shown to be identical with that which appears to be responsible for the primary and more marked attack.

CONCLUSION.

As far as the available evidence goes, it may therefore be concluded that septic pneumonia and its generally associated primary catarrhal condition are not infectious nor are they directly transferable from one horse to another except under certain conditions of experimental infection. These artificial conditions of infection are more readily induced in the heavier class of horse, upon which class also falls the main incidence of the disease itself. The chief, and probably the sole factor, determining the establishment of the disease would appear to be a condition of lowered vitality of the mucous membrane of the respiratory tract, however brought about, thereby rendering possible the invasion of a prevalent micro-organism. In this way collective outbreaks of a seemingly infectious nature become explicable on the grounds of a common exciting cause.

GENERAL REMARKS.

The work of the enquiry—disjointed as it has necessarily been by the pressure of other more immediate duties—has been further restricted by the great difficulty of obtaining apparatus and material. Such apparatus as has been obtained has not been satisfactory for critical work. This remark specially applies to the microtome photographic and optical apparatus necessary, for economy prevented the obtaining of first-class apparatus, but delay in furnishing on the part of the manufacturers has been a much more serious cause of want of progress, and such details as efficient microscopic lenses, promised for early delivery many months ago, are still not to hand. The work therefore has had perforce to be carried out with means which have not always been suited to the critical conditions necessary to any work of research.

The cost of the enquiry so far has been approximately as under, and expended from the £1,000 voted for the carrying out of the investigation.

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The cost of the enquiry so far has been approximately as under, and expended from the £1,000 voted for the carrying out of the investigation.

	£	s.	d.
Apparatus, equipment, fittings, etc.	272	10	0
R.E. services for slight alterations and fitments, erection of loaned fencing for paddock, etc., probably about	10	0	0
Salary of laboratory assistant	55	8	0
Incidentals	14	0	0
	<hr/> £351 18 0 <hr/>		

Exact figures are not all in the possession of the writer, but it is thought the total as shown will be found approximately correct and the unexpended balance about £645.

EDITOR'S NOTE.

The substance of the Report as above was accompanied by a number of appendices illustrating its text. These appendices comprise charts, tabular statements, micro-photographs, etc., and are too voluminous to reproduce here.

It is thought, however, that the text in itself is sufficiently clear to warrant the omission of these appendices.

THE FRENCH OPERATION FOR QUITTOR.

BY MAJOR VICTOR C. LECKIE,
Army Veterinary Corps.

THE following report of an operation for Quittor, styled the "French operation," is put forward as being found to be, from all points of view, the most successful method of dealing with Quittor in all its forms.

Various methods have been tried, but none have given such good results as the method hereafter described.

Out of 217 operation cases for quittor in horses between January 1st, 1917, and April 30th, 1917, the following results have been observed: Seventy-one were cured with an average of 41½ days under treatment; eleven have been transferred sick with an average of 33 days under treatment; twenty-two have been destroyed or died with an average of 21 days under treatment; 102 remain which have, to date, an average of 29 days treatment; the remaining eleven cases required a second operation, of which three were cured with an average of 82 days under treatment; one was destroyed after 55 days treatment; and seven still remain.

OPERATIVE TECHNIQUE.

Having ascertained the depth and direction of the sinuses by probing, a semi-elliptical incision is made (A to B, Fig. 2), the lower edge of the incision being parallel to the superior border of the coronary band. The portion removed is the shape of a "quarter" of an orange.

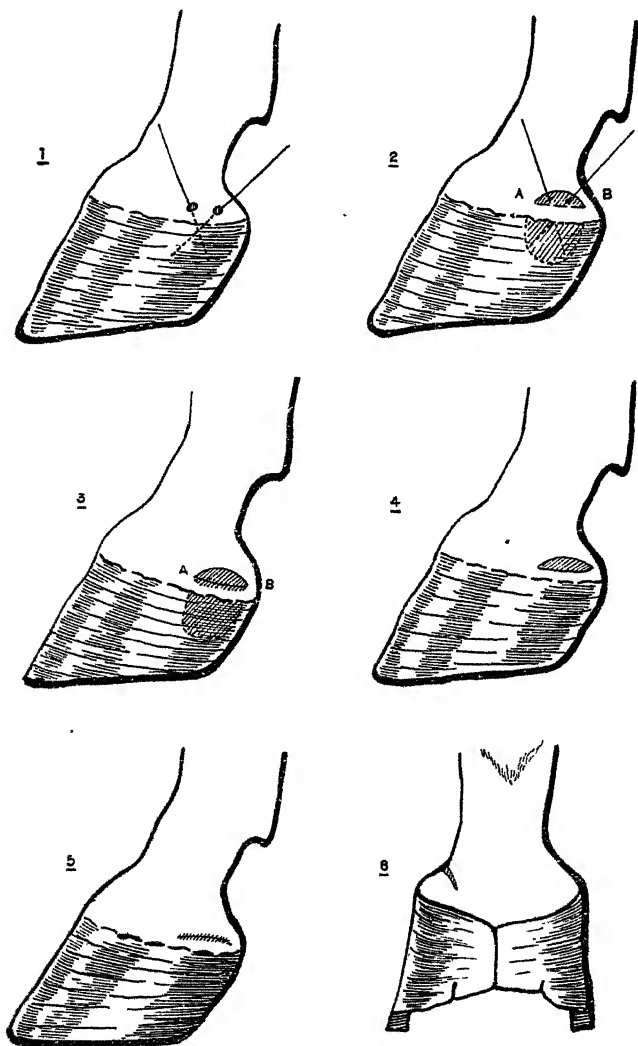


FIG. 1.—Position of the Sinus.

FIGS. 2 and 3.—Site of Incision and position of the Cartilage.

FIG. 4.—The Wound after the Cartilage has been removed.

FIGS. 5 and 6.—The Scar after healing.

Care is taken in making the incision to include the sinuses (one or more), taking in at least $\frac{1}{2}$ inch on each side. The picture then produced is as in Fig 3, leaving the cartilage exposed to view at A and B. This is stripped out on the inside of the wall (as shown by the dotted line A C B, Fig. 3), with a Renette (the most useful pattern being as in Fig. 7), or with a "French hoof knife," as shown in Fig. 8.

By drawing from before, backwards, the whole of the lateral cartilage below the coronary band may be stripped out. The portion of the lateral cartilage above the coronary band may be removed with a scalpel and sage knife. In this way the whole of the lateral cartilage is removed, and the picture presented when the operation is completed is as in Fig. 4.

The cavity formed within the wall is packed with the following :—

Hydrarg Binioid	..	..	1
Calomel	..	..	2
Zinc Oxide	..	..	16

Fig. 7



8



9



FIG. 7.—Renette.

FIGS. 8 and 9.—French Hoof Knives.

The foot is bandaged and the dressing repeated in 'four days' time, or an alternative treatment being the above dry dressing once, and an application of hot hypertonic saline solution every alternate day.

ADVANTAGES.

For the foregoing operation the following advantages are claimed over other methods :—

1. The operation in itself is very simple.
2. It may be performed in 10 or 15 minutes.
3. The operation wound takes less time to heal than with other methods.
4. Very easy to dress. Lack of drainage does not appear to retard healing in the slightest.
5. There is no hoof deformity after the wound is healed.

6. Permanent lameness is very rare after the operation.
7. Less liable to open joint during the operation.
8. After about ten days the animal as a rule shows little or no lameness.
9. A second operation is very rarely necessary as the whole of the cartilage is extirpated.
10. By dressing every fourth day there is considerable saving in bandages, wool, and dry dressing powder.

AN EXTENSION APPARATUS FOR USE DURING FOOT OPERATIONS.

By MAJOR J. R. HODGKIN.

Army Veterinary Corps.

Having felt the need of some mechanism for restraining the foot and making tense the capsular ligament during foot operations, particularly that for quittor, I had frequently expressed the wish that someone would think out a device for fixing the toe.

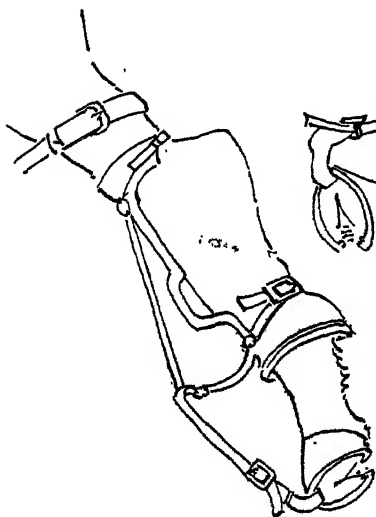


FIG. 1.—The Apparatus ready for Final Adjustment.

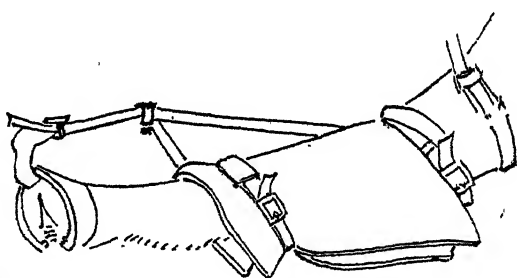


FIG. 2.—The Apparatus tightened up ready for the Operation.

An idea for such an apparatus occurred to No. 9635 Lance-corporal T. W. White of this hospital, who was at the time an assistant in the operating theatre. This was speedily improved upon; the design, of which I attach a sketch, was found to be most satisfactory, and was adopted. This has been in use in the hospital for over a year and a half.

It consists primarily of an iron framework with two stays to embrace the leg above the knee or hock. Interposed between this and the leg

is a felt pad, which is stitched on to the leather covering the iron frame. Each stay has a buckle fastened on to it inside and out, a single strap holed at each end completing the arrangement for attachment to the leg. It is important to have a buckle at each side, for then the device can be used on any leg—upper, lower, fore, or hind.

The remainder of the framework forms the lever which elevates the toe, and is roughly triangular in shape. The side of the triangle which connects the two stays and is next to the leg is arched, having a rectangular projection outwards. This is found to be necessary to prevent buckling when the toe was braced.

A serrated hook which clasps the toe of the shoe or foot, and to which is attached a buckle to join up to the strap mentioned above, completes the apparatus.

The foot having been prepared and the apparatus adjusted, the toe is braced as firmly as possible.

Advantages :—

1. There is perfect rigidity of the operation area, facilitating work.
2. The capsular ligament of the pedal joint is rendered tense, which minimises enormously the danger of its puncture.
3. It dispenses with the services of an assistant to hold the foot

SURGICAL TREATMENT OF COMPOUND FRACTURE OF THE RIB.

BY CAPTAIN A. R. ROUTLEDGE, A.V.C. (T.F.).

METHOD OF OPERATION.

AN incision, varying in length according to the class and extent of the fracture, is made along the middle line of the rib, down on the bone. The periosteum dissected back till the rib is exposed all round. Great care must be taken in carrying out this detail to guard against puncture of the thorax.

Some cases are easier to deal with than others, inflammatory action and suppuration occasionally causing mechanical separation, leaving the rib more or less bare.

Having completed the dissection, the rib is cut transversely above and below the fractured area with a strong pair of bone cutters, and the excised piece lifted out.

Transverse fractures are comparatively easy to deal with, a bone spoon or the finger being placed under the rib, lifting and pulling it up while the rib is severed with the cutters.

Extreme caution must be exercised when the rib is broken into long sharp fragments, which, in removal, are apt to puncture the pleural cavity.

Varying sections up to five inches of rib have been excised in this series of operations. Only two cases required a second operation.

AFTER TREATMENT

is as for a granulating wound—suppuration should be reduced to a minimum in a few days, if all the damaged bone has been removed ; if it continues, a second operation is indicated.

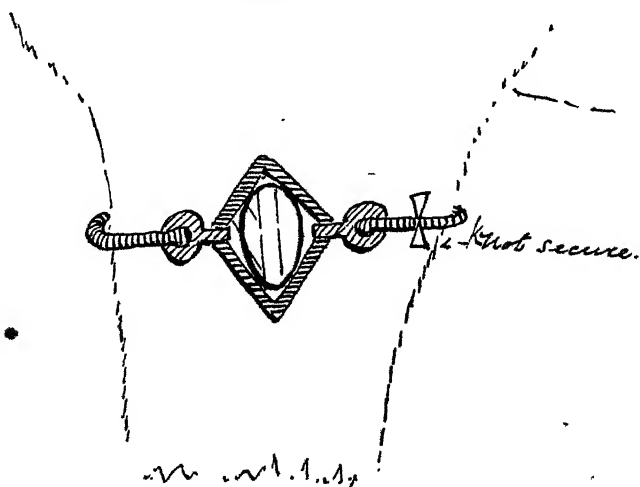
SUMMARY

Of 16 cases treated : one died three days after operation from pneumothorax ; three destroyed ; one chest punctured during operation ; one three days after operation, pneumothorax ; one twenty-five days after operation, pus burrowed behind the rib stump, septic pleurisy developed ; five cases doing well, with an average of 28 days' treatment ; seven cases cured and issued in 41.5 average days.

RETRACTING HOOKS FOR NEURECTOMY OPERATIONS.

BY CAPTAIN A. R. ROUTLEDGE, A.V.C. (T.F.)

Method of Use.—A piece of stout tape is applied to one hook which is fixed to one lip of the operation wound. The tape is drawn tightly round the limb and fastened to the second hook, which retracts the other lip of the operation wound.



The Retracter Hooks in Position.

If carefully fixed and tightly applied, hæmorrhage is checked, giving a practically bloodless field of operation. The tissues can then be readily identified—of great value in the median operation.

Hooks similar in pattern to an ordinary button-hook with spatula handle have been found of great use in performing neurectomy.

especially the median and posterior tibial operations, being useful to pick up the nerve or hold tissues back, and the handle can be used as a separator to isolate the nerve from the vein without dissection.

FOREIGN BODY IN THE PHARYNX OF A HORSE.

BY CAPTAIN C. E. W. BRYAN.

Army Veterinary Corps.

FOREIGN bodies in the mouth of pharynx of the horse are not infrequently met with, and the one herewith sketched was of exceptional interest as illustrative of how much danger and discomfort can be caused by so small a thing.



Sketch of sharp, thorny twig (actual size) removed from the back of the Pharynx.

The animal on arrival was observed to be not feeding, with head poked out straight, suggestive of laryngitis. There was no temperature. The next day the same symptoms prevailed, accompanied with frequent retching movement of the head and neck. Also a desire to feed, but a difficulty in swallowing. A foreign body was suspected in the throat, and an examination in the standing position with an old pattern gag was made of the pharynx. A foreign body resembling

wire was felt, but owing to restiveness, no doubt caused by pain, the animal would not stand sufficiently quietly for it to be extracted, and he had to be cast.

Upon putting the patient down and examining the mouth leisurely with a speculum, the piece of thorn shown in the sketch was discovered and removed. It had become embedded in the mucous membrane and muscles at the back of the pharynx and required considerable ingenuity to remove it without damaging the tissues. A week later the horse was back at work.

For the sketch I am indebted to Staff-Sergeant Weyman, A.V.C.

NOTES ON CONTAGIOUS BOVINE PLEURO-PNEUMONIA IN NORTHERN RHODESIA.

By G. H. BROGAN, M.R.C.V.S.

Kalomo, Northern Rhodesia.

THIS disease was introduced into Barotseland in 1915 from Portuguese West Africa, where, according to all accounts, it has been endemic for some years. From there it was brought down to several cattle districts on the railway line by traders, whose principal object appeared to be to rush the cattle through and get rid of them. It transpired afterwards that a larger percentage of animals than usual expired on the way down, but no reports were made to the Department; there appears to be little doubt that a number of these deaths were due to pleuro-pneumonia. Cattle are the only animals affected in this country by the disease.

At first it spread rapidly—at all events rapidly for pleuro-pneumonia—largely owing to the fact that quarantine measures, in the absence of a qualified veterinary staff on the spot, were not rigidly enforced; this appears to be more responsible for such spreading than the susceptibility of the cattle or virulence of the disease. However, as soon as possible a veterinary officer was put in charge of each large infected area along the railway line, and systematic measures for the control and elimination of the disease were carried out as energetically as circumstances permitted. The measures adopted consisted of:—

- (1) Quarantine of all herds in suspected area.
- (2) Slaughter of all affected animals.
- (3) Inoculation of all in-contacts and suspected in-contacts as far as the supply of virus permitted, and branding of all animals so inoculated.
- (4) A buffer area, in which no cattle movements of any kind were allowed for some time, in order to cut the disease off from the remaining cattle districts.

Measures 1 and 4 do not appear to require any further amplification.

(2) This measure met with a good deal of opposition from local cattle-owners, who maintained that some animals recovered and salted. There is no doubt that some animals do recover and are possessed of a certain amount of immunity, but, owing to the danger of lungers, it is essential to success in controlling this disease to permit no recoveries at all.

(3) Pleuro-pneumonia inoculation, although nothing like so satisfactory as the simultaneous method in rinderpest, is still, in my experience, a beneficial measure in infected areas in those countries where absolute slaughter is out of the question.

I believe Dr. Theiler has succeeded in producing the disease with characteristic pulmonary lesions by inoculation in the tail, but, as far as one is able to judge by clinical work in an unfenced country, this only occurs occasionally, though on this account inoculation should never be recommended for totally clean areas.

Members of a herd which have not reacted to a first inoculation should be re-inoculated, and it will be necessary to do some a third time; animals which have not reacted by then will not react at all. In this connection calves prove more refractory than adults.

Glycerinated virus was generally used here, and kept under ordinary conditions; it does not appear to be safe to use it after ten days.

The thread method seems to be preferable to the syringe in actual practice in this country, as, owing to the tightness of the tissues of the tail, and the defective condition of most of the syringes immediately available in the field, some, if not all, of the dose is frequently lost by the latter method. Ordinary cleanliness should be observed, but the application of strong antiseptics to the tail is inadvisable, as should any obtain entrance to the tissues the resulting irritation does more harm than good.

In some cases inoculation was carried out by the owners themselves or their friends, who would not take the advice of the Veterinary Department, and in some instances they suffered heavy losses for the reason that they used an infected virus, or severely bruised the tissues of the tail during operations; perhaps in some cases both factors were at work. I came to this conclusion because of the rapid spread of gangrene up the tail; if this heavy mortality had been mainly due to the use of a strain of unusual virulence I think a number of animals would have shown joint lesions. The only animals I saw myself with joint lesions were in herds which were not unduly affected with necrosis or gangrene of the tail.

My conclusions in this respect are largely based on the reports I

received, as it was not possible for me to see all of these animals personally, owing to the large extent of country involved, the delay in receiving reports, and difficulties of transport.

The after-treatment of inoculated animals had to be largely left to the owners themselves, as the veterinary staff was much too small to carry it out, and, as the stock is running on large unfenced areas, there is no doubt that most of them are left to take their chance.

GENERAL.—The disease first appeared in this district in May, 1915, and the heaviest losses took place before the end of July, when I arrived to take control of the anti-pleuro-pneumonia measures in this district. The last case occurred on November 11th, 1916, so that there has been no case now for over seven months, but at the same time it is possible that there are a few lungers in existence. I append a list of statistics which is approximately correct, as all the herds were numbered fairly regularly and a mortality list kept.

APPENDIX : KALOMO DISTRICT.

FARM CATTLE.

Deaths P.P.	Deaths Inoc.	Deaths O.C.*	Total Deaths.	Remaining.
500	429	365	1,294	7,478

NATIVE CATTLE.

No. kraals.

105	61	215†	—	276	2,231
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Translation.

BACTERIO-THERAPEUTIC TREATMENT OF ULCEROUS LYMPHANGITIS.

By C. TRUCHE.

AMONG ailments affecting our cavalry in the actual campaign, the lymphangites occupy a very important place. All veterinarians find themselves busy against these serious maladies, which, at first, furnish a strong contingent of non-effectives and then a number of chronic hospital cases. The length of treatment, the repeated care and attendance which they exact, puts science and the medical personnel to the test.

The two chief types, actually known, are epizootic lymphangitis, which we do not touch on here, and ulcerous lymphangitis, to which we have applied a simple and effective therapy, as we shall see.

Let us recollect, however, that for this latter ailment local treat-

*Includes other causes.

†Deaths from other causes are chiefly due to skin disease and poverty.

ment gives some good results, but these are only obtained after long months, and a relapse is always possible. It is also necessary to count equally on incomplete cures leading to thick legs, discharge or slaughter—in a word to very great monetary loss.

THE BACILLUS OF ULCEROUS LYMPHANGITIS

(b. of Preisz-Nocard).

The bacillus of Preisz-Nocard, concerning which we give briefly the essential characteristics, is a very ubiquitous one. It attacks different species of animals, causing: in the horse (besides ulcerous lymphangitis) contagious acne, renal abscesses; in the sheep, a veritable pseudo-tuberculosis, with caseous visceral and glandular lesions; in the ox and pig splanchnic lesions.

We have encountered in the past spontaneous abscess in the rabbit, and in the goat an abscess due to the exit of the microbe in the course of immunisation against the ricinus.

It is an organism simulating the diphtheria bacillus, both in its morphology and cultural characteristics; but it is radically distinguished by its virulence and the nature of its toxin, as we shall recall in two statements.

Virulence—Guinea pig.—Under the skin: abscess. In the peritoneum: vaginitis. In the veins: generalised pustular eruption, keratitis, osteo periostitis, granulations or caseous nodules in the liver, spleen, and lungs. The researches of Panisset (these Annals, June, 1910), carried out at the laboratory of M. Nicolle, have shown the great activity of the b. of Preisz-Nocard towards the guinea pig; certain samples infect it in even very feeble doses.

Rabbit.—In the veins: generalised pseudo-tuberculosis.

Sheep.—Under the skin: abscess. In the lungs: caseous pneumonia (Sivori).

Horse.—Under the skin: abscess. In a blood swelling: lymphangitis (Nocard).

Toxin (Carré, M. Nicolle, Loiseau, and Forgeot).—Every time large quantities of the germs are injected into animals they are rapidly killed by the toxin which they contain, and which does not differ from that of the filtrates. This toxin easily causes death to the guinea pig, rabbit, and sheep, even under the skin. The symptoms and lesions observed have nothing in common with those which determine diphtheritic poison.

Carré was the first to obtain an antitoxin serum which specifically neutralises the toxin of the bacillus of Preisz-Nocard. The same author has isolated from the system of certain sheep infected in a benign and localised form, some samples which were quite avirulent

(which have proved themselves equally a toxic).—M. Nicolle, Loiseau, and Forgeot.

ANTITOXIC POWER OF SERUM OF HORSES AFFECTED WITH ULCEROUS LYMPHANGITIS.

Uselessness of this Antitoxic Power.—M. Nicolle, Loiseau, and Forgeot have observed that the serum of horses affected with ulcerous lymphangitis (or multiple abscesses) was endowed with a *specific antitoxic power* equal or even superior to that of horses immunised by Carré by means of filtrates. They are based on this property, a sure and delicate diagnostic method (toxino-diagnostic) which reveals infection by the b. of Preisz-Nocard in the absence of all clinical symptoms (little abscesses of the kidney well tolerated). For details of Forgeot and Césari (these Annals, Vol. XXVI, p. 102—1912).

If one recognises a constant antitoxic power and the quasi-incurable character of the lymphangitis, one can affirm that the humours do not render any service to animals affected.

ABSENCE OF ANTI-MICROBIAN POWER IN THE SERUM OF HORSES AFFECTED WITH ULCEROUS LYMPHANGITIS.

The absence of all anti-microbial power in sick horses (Nicolle, Loiseau, and Forgeot) explains the essentially rebellious character of the affection, and leads to the trial of bacterio-therapeutic methods. Circumstances have not allowed them to realise this plan. We ourselves have had the same idea and have had an opportunity of carrying it out.

CHOICE OF A VACCINE : ITS PREPARATION, ITS MODE OF EMPLOYMENT.

We have given preference to microbes killed by alcohol-ether for a preparation quite convenient to use. Used *copiously* at the laboratory since the works of M. Nicolle on glanders (these Annals, Vol. XX, pp. 625, 698, 801—1906), they have the advantage of expelling the life (that is to say, the virulence) of the organisms without altering their antigenic qualities (and even, in a measure often sufficient, their toxicity). With these "alcohol ether" microbes M. Nicolle and his collaborators have practically succeeded in preparing agglutinating and lytic serums which are very effective and whose properties have already been mentioned in these Annals or will be eventually.

Preparation.—The b. of Preisz-Nocard preserved on coagulated serum is sown on potato, put in an autoclave for 24 hours, then the microbial deposit obtained is emulsionised in physiological water. It is centrifugalised with Jouan's apparatus, decanted, and the sediment diluted in physiological water; it is centrifugalised a second time, and finally decanted. The deposit is then carefully emulsionised in alcohol; one attenuates it little by little with a fresh quantity of

alcohol, and then adds an equal volume of ether. It is preserved for 24 hours in mouthed flasks (the organisms collect in the bottom of the flasks), the alcohol-ether is decanted, and the deposits are dried at 37° (Jouan's desiccation apparatus) in sterile boxes of Petri. One obtains in this manner a powder easy to preserve and dispense. To prepare the vaccine, one carefully emulsionises this powder in physiological water, in the proportion of 1 centigramme to 1 c.c. of liquid; it is distributed into ampoules which are left for five minutes in a temperature of 100° C. ("safety sterilisation" and destruction of remnants of toxin. This last precaution may be said to be superfluous, since infected horses are immune against the poison).

Method of Use.—The vaccine is injected subcutaneously under the skin of the neck in a dose of 1 centigramme. This treatment is repeated every eight days on one or two occasions, according to the gravity of the case.

Slight local swelling occurs on the morrow and disappears rapidly. Feeble thermic reaction ($\frac{1}{4}$ to 1 degree). No general reaction. One sees "the buttons" dry up, suppuration decrease, and the cords disappear after the second injection, but cure generally follows the third. The affected limbs recover their mobility and the skin its suppleness as soon as the local lesions have disappeared. Relapses, which are rare, yield to a fresh injection.

ACTUAL RESULTS OF BACTERIO-THERAPEUTIC TREATMENT.

First experiments (Depôts of Belleville and Greuelle):

Horse 10,812.—Buttons and cords on the near hind limb (bacteriologically diagnosed); three injections; cure in a month.

Horse 12,117.—Very serious lymphangitis of the whole external surface of the off hind leg (bacteriologically diagnosed); three injections; cure. This horse worked for over a year without having any relapse.

Horse 10,203.—Buttons on the off hind shank (bacteriologically diagnosed); three injections; cure.

Horse 10,547.—Lymphangitis of the off knee (bacteriologically diagnosed); three injections; cure.

Horse 11,233.—Buttons and cords on the near fore leg (bacteriologically diagnosed); three injections; cure.

Later experiments undertaken through the kind support of Chief Veterinary Surgeon Jacoulet in a D.C.M.

First Series (Nos. 7918, 7919, 7928, 7905).—Classic lesions (bacteriologically diagnosed); three complete cures; one still incomplete, but much improving.

Second Series.—Forty-three horses (no bacteriological examination but classic lesions). Results: a few after the third injection; 14

completely cured ; seven without doubt cured ; only exhibit superficial lesions, due in our opinion to rubbing from mange with which they are affected. Ten incompletely cured (need one injection) ; six slightly improved (will need two injections) ; three died of different ailments in the course of treatment ; three slaughtered because of old age or bad general condition.

In this second series, where bacterial diagnosis had not been made, might possibly be included subjects affected with a lymphangitis to which the b. of Preisz-Nocard remains foreign. The majority of the cases, however, show how beneficial the treatment is. Other cases in different parts of France have been treated with success.

We conclude that bacterio-therapeutic methods applied by us in the treatment of ulcerous lymphangitis have furnished quite indisputable results. These results are interesting, not only from the theoretical point of view, but from an economic and immediate aspect.—(*Annales de l'Institut Pasteur.*) G. M.

SOME PROFESSIONAL MATTERS CONCERNING THE ITALIAN ARMY VETERINARY CORPS.*

At the sitting, on July 4th, 1917, of the Italian Chamber of Deputies, a direct question was asked of the Minister of War, in the name of sixty members, upon the conditions of undeserved inferiority existing in the Veterinary Corps, as compared with other Corps and the Veterinary Corps of other Armies ; and, on his having promised, but not conceded, certain improvements, both moral and pecuniary, at the end of May, 1916 (which were re-confirmed in September, 1916), which assured to the Army Veterinarians the following points :—

(1) Due recognition by the authorities concerned for good service rendered in the field of hygiene and of horse-mastership.

(2) A state of contentment which is indispensable for the carrying out of professional duties.

(3) The power to apply discipline more thoroughly than is actually done at present to the personnel of the dispensers, dressers, and orderlies.

(4) To recognise the fact that they provide the country with an efficient protection in connection with the live stock, defending it against disease, and providing at the same time for the provisioning of the civil and military population, a very grave problem.

The Hon. Signor Pucci, after having very eloquently explained the important function of the A.V.C., especially during the war, and having put before the Chamber many examples of the inferior position in which Italian veterinarians were placed in comparison with those of other armies, etc., suggested a method of reform which

**La Clinica Veterinaria*, August, 1917. Translated by Captain H. L. Somers A.V.C.

the Government ought to follow, not only in the moral and material interests of veterinarians, but also in the interests of national economy. He then went on to say: "To obtain the best preservation of the animals necessary for the development of warlike operations, the first consideration is that they shall be carefully selected and examined at the commencement. This, in our opinion, should be arranged for by the heads of the Army Veterinary Service who have to provide for the needs of a certain area. Upon these officers must be conferred the rank of lieutenant-colonel, which would give them the military authority required for the observance of their orders. It is also advisable to place the 'Camp Infirmaries' under the direction of veterinary majors, who are likely, as a result of their long practical experience, to manage them to advantage and to render them more perfect. It is, in fact, essentially in these camp infirmaries that opportunity exists for the most thorough examination of animals, because it is from these establishments that diseases may be disseminated. The veterinary lieutenant-colonels of the army must also, for disciplinary reasons, be eventually raised to the rank of colonel. We should not delay the promotion to captains of all those subalterns who rendered effective service early in the war—this would prevent veterinary lieutenants finding themselves under the orders of captains who were only sergeants before they obtained their effective promotion.

In effecting this system of creating veterinary officers for the needs of war, we should have colonels placed in control of the bacteriological laboratories, the schools of cavalry, general management and horse inspection; the lieutenant-colonels in close conjunction with G.H.Q., and the majors in touch with the control of the most important infirmaries. These embody the proposals which I hope will be confirmed by the Minister of War, and also by the Commander-in-Chief in the true interests of the animals entrusted to the Military Veterinary Corps."

The Under Secretary for War, General Montanari, replying to the Hon. Signor Pucci, spoke of the differences existing on the question of rank in the different armies, stating that all the armies unfortunately had not the same powers for improving the careers of their officers, and we must not forget that the Government quite recently has gone into this matter of the Army Veterinary personnel, making many promotions. There has been an increase in the number of lieutenant-colonels and majors (increases respectively of 150 per cent. and 50 per cent.) and the promotion to be majors of those captains who gained their first epaulets in 1890. Also that all lieutenants dating from April 9th, 1911, automatically attain the rank of

captain, some being of the standing army, and some of the Territorial Militia, as a matter of fact the total has been more than 100 officers. This has been already carried out, and it is noteworthy that the lieutenants who are promoted to be captains equal in *status* the captains of the Carabinieri and Cavalry. This should prove quite satisfactory. As to the other questions raised by the Hon. Signor Pucci, the Government is by no means unwilling to examine his proposals and projects, and where it is possible to provide that duties correspond with rank.

The Hon. Signor Pucci thanked General Montanari, and after a few criticisms came to the conclusion that for the organisation of the Army Veterinary Service they could depend upon being treated by the Government with justice and consideration.

Correspondence.

PUNCTURED EYEBALL CASE.

To the Editor of THE VETERINARY JOURNAL.

DEAR SIR,—Captain Routledge describes an operation on punctured eyeball cases in your last issue which I think deserves notice. It is quite evident that in bad injuries of the eye the complete removal of the eyeball, with its possible septic complications, is not necessary unless the injury is accompanied by a septic wound affecting the orbital fat. I do not find cocaine necessary, as chloroform is used, and the contents of the eye are always carefully removed, even to scraping away the retina and flushing out the cavity, in order to shorten the period of suppuration. The membrane nictitans is always removed, for the reason given by Captain Routledge.

The main advantage of this operation is undoubtedly the shortness of the period required to keep the animal off work. The pain is markedly less the day following, and the horse may return to work within a week.

Daily flushing of the cavity with saline solution is tolerated by most horses after the first day without restraint.—Yours truly,

L. AUCHTERLONIE (Captain A.V.C.).

Personal.

CAPTAIN STEWART and CAPTAIN J. M. RICHARDSON, A.V.C. (R.F.), have each been awarded the Military Cross "for Immediate Reward." Captain Richardson was wounded, but has, we are glad to say, progressed satisfactorily. They were each specially reported upon for the excellent services which they had rendered.

NOTWITHSTANDING the fact that they have each reached the age at which they may legitimately expect to take things easily, and not be serving amongst the irksome duties of war, Professor Veranus A. Moore, the Director of the New York State Veterinary College, Cornell University, and Professor Williams, the well known teacher of Surgery in the same Institution, are each doing good work for the Veterinary Department of the American Army. Brilliant examples which cannot help but make the younger members of the profession "do their bit"—ungrudgingly, too.

A NUMBER of deaths have recently occurred amongst our French colleagues, and several have received honourable mention:—MM. Callard, Roux, Foucault, Abraham, and Chuffiat have been killed by bombs or shell fire. MM. Picq, Bouchet, Satillat, Rouard, Granon, Moura, Moncharmont, and Girard have each been specially mentioned in Orders for zeal and devotion to duty under trying conditions.

Obituary.

CAPT. ALFRED HOSKIN, F.R.C.V.S., A.V.C.

The toll of war has taken another of our most promising young officers, for Capt. Alfred Hoskin had already "made good" in his professional career. Born at Liskeard, in Cornwall, in 1891, he graduated from the London College in 1913, and took his Fellowship at the earliest possible opportunity. Joining the Army Veterinary Corps in October, 1914, he had in due course obtained his Captaincy, serving most of his Army career with the Expeditionary Force in France. He was seriously wounded on the 2nd of July, and died two days later.

NOTICES.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Gerrard 4646. Telegrams: "Baillière-Rand, London."

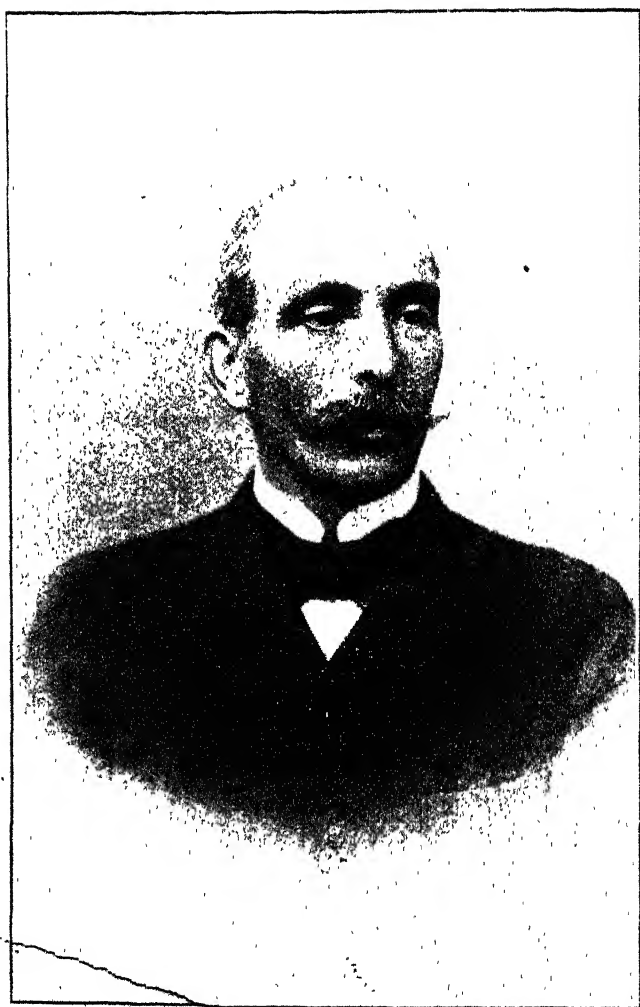
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THE LATE MR. W. C. BARLING, M.R.C.V.S.

THE VETERINARY JOURNAL

Editor :

FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING;
MAJOR IN THE ARMY VETERINARY CORPS.
HONORARY MEMBER OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION.
CORRESPONDANT ÉTRANGER DE LA SOCIÉTÉ DE MÉDECINE VÉTÉRINAIRE DU
BRABANT (BELGIUM)

Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

NOVEMBER, 1917.

Editorial.

THE VALUE OF A PROFESSIONAL PRESS.

THAT the Press should be censored is very necessary, and no one now denies that what was considered irksome in this direction at the commencement of the war has become a grim necessity.

That the professional Press should have its share in this is also wise, and we in our profession, whose mission is to deal with large bodies of horses, bow down willingly to the law.

To carry on at all is something under the present conditions, and that we are able still to present articles of original research and clinical value speaks well for the enthusiasm of our contributors and readers.

In fact, we may almost venture to state that the war has "bucked up" our contributors, instead of diminishing either their numbers or the value of their contributions. Original articles figure largely in our columns, and quite a number of diseases unknown to practitioners in Great Britain have been described and worked upon since the war area was entered. Take, for example, the ravages of the Preisz-Nocard bacillus, giving rise to Ulcerative Lymphangitis or Ulcerative Cellulitis, as it has also been termed; take Epizootic Lymphangitis, Stomatitis, Ulcerative Necrosis, the part played by forage acari, to say nothing of the proof given that it is possible now-a-days to keep a huge army free from Glanders by the Mallein test.

Surgery, again, has its chance, and many new operations are being described and regularly practised. It is indeed the opportunity for the keen, observant veterinarian, an opportunity such as will probably never occur again, and we are all grateful to observe that it is not being neglected.

The value of all this is, however, increased a thousandfold by the fact that the publication of our professional journals still continues, and for this we of the profession have much to thank the publishers and those who attend to the financial side.

Professional journalism never was a paying game, especially in a small profession like ours, and that our publishers stand by us and still allow their publications to appear—and that without a grumble, too—speaks volumes for them and adds another link to the chain which binds together the lay portion and the professional.

If only our contributors will continue to play their part, and send articles of the same quality as come in at present, we need have no fear that the value of the continuation of our professional Press will be more than a thousandfold repaid to ourselves and to the generations who will have to follow us.

Original Communications.

REPORT ON ULCERATIVE CELLULITIS—ULCEROUS LYMPHANGITIS.

BY CAPTAIN E. A. WATSON, C.A.V.C.

The A.V.C. Bacteriological Laboratory, B.E.F.

INTRODUCTION.

THE term "Ulcerative Cellulitis" is officially used in the British Army Veterinary Service in France to designate a characteristic type of progressive inflammation and suppuration producing purulent ulcerous lesions on the limbs of horses, and is regarded as contagious in nature and inclined to rapidly spread where horses are congregated in large numbers. I have already indicated, in a preliminary note on this subject, that "Ulcerative Cellulitis" is a form of the disease better known as the Ulcerous Lymphangitis of Nocard (*La Lymphangite Ulcèreuse*). This view is fully confirmed by my further investigations, and it may be clearly stated as such without the slightest hesitation, for the etiological factor in the disease is the bacillus of Preisz-Nocard. This fact is thoroughly established on the clearest bacteriological evidence.

There has been, and still is, in some quarters, a tendency to regard "Ulcerative Cellulitis" as a specific infection distinct from Ulcerous Lymphangitis. Such a view and differentiation seems to have arisen when the disease first appeared among the army horses, partly through a misconception of the anatomical changes in, and the symptomatology of, Ulcerous Lymphangitis, and the different forms of disease caused by varieties of the Preisz-Nocard bacillus.

There is a mistaken idea that in Ulcerous Lymphangitis the lymph

glands are mainly involved, that they become swollen, indurated, and suppurate. This is an erroneous conception, and it needs only a reference to the standard work of Hutyra and Marck to point it out. It is stated there, clearly, that—

“Ulcerative lymphangitis is a chronic contagious disease of horses, in the course of which, usually without involving the regional lymph glands, there develops The lymph glands in the regions of the ulcerous processes may occasionally undergo moderate swelling, but as a rule there is no induration, while suppuration never occurs.”

Further, particular stress is laid upon these points, in the same work, in differentiating the disease from cutaneous glanders and epizootic lymphangitis, in either of which the lymph glands are extensively involved.

It is unfortunate, therefore, that these important points which exactly apply to Ulcerative Cellulitis should have been disregarded or wrongly used to differentiate identical conditions.

A tendency to regard Ulcerative Cellulitis as exclusively a localised, and Ulcerative Lymphangitis as a rapidly generalised infection has also led to confusion.

The fact is that we are dealing with but one disease, but one in which the causative organism—the bacillus of Preisz-Nocard—varies greatly in virulence, toxin production, etc., consequently, and in conjunction with different modes of infection, various types or forms of the disease are set up, as we shall see further on. Just as different strains of the bacillus of glanders and of the bacillus of tuberculosis set up different types of disease in the same and in different species of animals, so does the bacillus of Preisz-Nocard.

Finally, it is probable that many causes of simple wound infections and abscesses arising from punctures of the skin—due to one or another of the varieties of pyogenic diplo-, staphylo- or streptococcus—are mistaken for Ulcerative Cellulitis. Such infections may and do not infrequently occur in the disease under discussion, but then they are secondary and not the causative factors.

It is of no consequence whether we call the disease Ulcerative Cellulitis or Ulcerous Lymphangitis, and draw arbitrary lines of distinction in the different forms and stages of the disease, but it is important in the control and suppression of it to recognise their co-relationship, common origin and cause.

The importance of this disease is well understood, both from a military and an economic point of view, from the large number of animals affected and the heavy losses that have ensued as a result

of it, by death or destruction, or by animals becoming unfit for further military use.

Acknowledgments.—This investigation of the disease, called for by the Director of Veterinary Services, B.E.F., has been carried out mainly at No. 6 Veterinary Hospital, and the A.V.C. Bacteriological Laboratory, where I was enabled to make the detection and identity of the bacillus of Preisz-Nocard, and, through the facilities given by Major Kirby, D.S.O.; in supplying animals and material for experiments, establish the specific relationship of that organism to the disease in question. No 19 Veterinary Hospital and the Indian Veterinary Hospital have also contributed by supplying material and carrying out experiments with the laboratory vaccines, reports on which have been handed in by Captains C. J. R. Lawrence, J. R. Greig and J. L. Clark.

Colonel A. C. Newsome, C.M.G., has directed and advised, and by timely suggestions and encouragement has contributed largely.

ULCERATIVE CELLULITIS—ULCEROUS LYMPHANGITIS.

(*Lymphangitis ulcerosa equorum.*)

Ulcerative cellulitis is a chronic infectious disease of horses and mules, characterised by a progressive development of abscesses and pus foci in the subcutaneous connective tissues, with a tendency to ulceration and usually without involving the large lymph vessels and regional lymph glands. It is caused by a variety of the bacillus of Preisz-Nocard.

Occurrence.—The disease is widely spread and prevalent among the Army horses in France. It occurs both in winter and in summer, and in horses that are well conditioned and cared for as well as among debilitated animals and those suffering from injuries, parasitic skin diseases and conditions of ill-health. The mud and rough conditions existing at the front predispose to and favour infection. Cases also develop in the Veterinary Hospitals, remount depôts, and wherever horses are congregated in large numbers.

Etiology.—Bacteriological evidence shows that an organism identical with the bacillus of Preisz-Nocard is the cause of the disease. This organism appears as a very short, delicate bacillus in separate particles, in pairs or in small masses. Frequently it is seen in a coccoid or oval form, and at first glance it is easy to mistake it for a micro or diplococcus. A familiarity with its cultural characteristics shows that in small masses it never grows in those regular grape-like clusters that are characteristic of staphylococci. Microscopic films show irregular clumps somewhat suggestive of certain forms of the diphtheria bacillus. Polymorphism is a pronounced characteristic.

The small coccoid or oval forms are most frequently seen in rapidly growing cultures; in aged cultures the bacillary form is apt to predominate, though many coccoid, swollen, pear and club-shaped or involution forms may be seen at the same time, in fact, all forms, typical and atypical, may occur in a single culture. The organism is non-motile, and does not form spores or capsules.

Staining.—The bacillus takes the ordinary aniline dyes readily. It stains sometimes unevenly, especially when a diluted stain is employed such as Carbol-fuchsin 1-20, the centre or middle being more lightly stained than the edges; in rapidly dividing organisms there may appear cross striations giving a more or less granular appearance. Both typical and atypical forms are Gram positive, staining intensely throughout.

CULTIVATION.

Liquid Media.—These are never turbid. There may be at first a slight cloudiness, but this is distinctly granular and the media soon clears by sedimentation. A granular growth develops at the bottom of the tube or flask, which on slight agitation breaks up into coarse granules. A greyish veil forms on the surface of ordinary bouillon if the culture rests undisturbed. This veil is not constant, but nearly so. Some strains form a very delicate and fragile veil, others a coarse and heavy one. On slight agitation the veil disintegrates and falls to the bottom. If a fragment be taken up on a platinum loop and passed quickly into a flame it crepitates and may fly off to quite a distance. By selection and subcultivation, a strain may be obtained that produces an abundant surface growth.

In bouillon-serum the veil does not form, but the deep growth is much more abundant than in ordinary bouillon.

In Martin's peptone broth there is no veil, the granules are coarse and heavy, and the media is always absolutely clear.

In glucose broth the organism does not grow well.

Solid Media.—On plain agar there is usually only a long delayed and scanty growth and with many strains none at all. On coagulated serum, serum-agar, blood-agar and potato-agar, the best growths are obtained. In 24 hours small round discrete colonies appear, greyish white, at first translucent, then opaque, with a waxy surface; on the 3rd or 4th day a papillate centre may be noted. On glycerine-agar there is no growth. In subcultures on favourable media, richly sown, a heavy white film covers the whole surface. Surface growths washed off in saline solution break up into granular masses which soon sediment. Prolonged grinding and shaking is necessary to obtain an even suspension, and even then the bacteria sediment down in a few hours.

Resistance.—In sealed agar tubes the organism remains alive for months and retains its virulence. In old bouillon cultures it may die out in the course of a month or two, owing probably to the development of toxins.

It is killed by heating at 60 deg. C. for half-an-hour, also after several hours contact with acetone, or with alcohol and ether in equal parts and then drying.

Pathogenicity.—The Preisz-Nocard bacillus is distinctly a pyogenic organism. Pure cultures injected subcutaneously produce a local suppuration and an abscess that comes to a head and ruptures in from 4-12 days, the wound healing in due course. When the inoculation is made under the skin of well-fleshed parts, such as the side of the neck or shoulder muscles, secondary abscesses and progressive inflammation rarely follow. When, however, the region of the fetlock or one of the fleshless tendinous parts of the extremities is the site of inoculation a typical abscess or bulla presents itself in from 3-5 days, ruptures, and discharges a creamy pus mixed with more or less blood and serum, becomes ulcerous, and heals tardily. Meanwhile, other typical lesions are developing, the infection progresses, and a clinical picture is presented identical with the "leg form" of Ulcerative Cellulitis.

A pure culture injected intraperitoneally into a male guinea pig produces a marked orchitis in about 4 days and death in 6 days or longer, depending upon the degree of virulence of the culture. Peritonitis and metastasis of the liver, spleen, and lymphatic ganglia are found on post-mortem examination.

Natural infection.—The appearance of the first visible lesion being in the majority of cases in one of the hind limbs in the region of the fetlock or between fetlock and hock suggests that the infecting organism gains an entry through a wound or abrasion, particularly such as is caused by the kick of a horse. Cracked heels, mud fever and any conditions in which the skin is broken favour the entry of the specific infection to the lymph spaces and subcutaneous connective tissues in which the disease first develops. However, many cases do occur in which there is not the slightest evidence of a wound or break in the continuity of the skin. Further, in the rarer forms of the disease—groups of small abscesses in the prescapular or precrural regions, one or two large isolated abscesses on the neck, back or loins, paranephritic abscesses, etc., in all of which a bacteriological examination reveals the Preisz-Nocard bacillus—the mode of infection cannot be explained.

Anatomical changes and Symptoms.—An abscess forms in the subcutaneous connective tissues. There is more or less diffuse swelling and tenderness. The abscess tends to rapidly come to a head in the

form of a soft node or bulla, ranging in size to that of a walnut, which ruptures and discharges pus. The character of the exudate varies. If pus is collected from a ripe abscess before the rupture, it is usually white and creamy. After the rupture the exudate contains more or less blood, and tends to become more and more viscid and, serous, especially if the lesion involves a capsular ligament or tendon sheath. The lesion has now the appearance of an angry-looking ulcer with loose and bulging borders. The ulcers tend to dry up and heal, sometimes within ten days, more often in from 2-3 weeks. Meanwhile, fresh abscesses and ulcers are forming in the neighbouring tissues or at some little distance further up the limb, and the disease progresses until, after some months, there may be evidence of 15-20 or more lesions in the various stages of eruption and resolution, the older ones cicatrised, others dry, scabby or granular, and the recent ones discharging pus or sero-sanguineous fluid. Several ulcers may become confluent and give rise to sloughing. When the hock or other joint region is involved, there is thickening of a part and the exudate is usually more persistent and sero-purulent.

The course of the disease is irregular and obscured. It commences most frequently in the region of the fetlock and slowly ascends. It may not advance above the hock or it may extend up to the thigh to the inguinal and perineal regions, sometimes involving the scrotum and vulva. In some cases there does not appear any visible connection between abscesses in the inguinal region and ulcers on the fetlock or hock. On the other hand the disease may commence as a hock infection and extend above and below, or it may first appear as an abscess inside the thigh.

The "leg-form" of the disease may be regarded as typical. In one group of 200 leg cases, 178 were affected in the hind limbs (158 in one and 20 in both hind), 18 in the fore and 4 in hind and fore limbs. The disease is often marked by periods of tolerance and latency, followed by recrudescence. It frequently happens that horses are passed out as cured only to be readmitted some weeks or months later when the disease has become active again.

Lameness is not a constant symptom, depending upon the situation of the abscess. When the hock, fetlock, or a tendon is involved lameness is severe, but tends to disappear soon after the abscess has ruptured. In very chronic cases there is much thickening of the tendon sheaths and capsular ligaments; ankylosis may follow a joint infection, and elephantiasis of a limb is not a rare sequel.

An important characteristic of the disease is that it does not involve the regional lymph glands in suppuration or ulcerative inflammation. Even in cases more generalised than local the lymph nodes do not suppurate.

The rarer and atypical forms of the disease are manifested in (1) a group or groups of small abscesses in the precural, prescapular, or pectoral regions, (2) one or more large isolated abscesses on the neck, back or loins (3) paranephritic abscesses of one or both kidneys, and (4) purulent foci in the lungs.

All of these diverse types have been met with among the animals under observation, and confirmed by bacteriological examinations. A strain of Preisz-Nocard bacilli obtained from a purulent kidney when inoculated subcutaneously on the side of the fetlock of a normal horse caused a typical leg-form of Ulcerative Cellulitis and proved to be very virulent.

Paranephritic abscesses have been frequently noted at post mortem examinations of horses destroyed or died on account of debility and emaciation and general ill-health. In a few of these cases, pus was collected and brought to the laboratory, and in each instance Preisz-Nocard infection was revealed by the cultural method of examination.

Diagnosis.—Chronic ulcerative cellulitis of a limb presents a sufficiently characteristic clinical picture for a diagnosis. It is differentiated from cutaneous glanders by the healing tendency of the ulcers and the absence of any noteworthy change in the regional lymph glands, which in both glanders and epizootic lymphangitis are indurated, swollen and contain pus foci. Further, the presence of the cryptococcus farciminosus in epizootic lymphangitis is easily ascertained.

The bacillus of Preisz-Nocard can be found in the pus of all cases of Ulcerative Cellulitis. When pus is drawn from a fresh and unopened abscess the organism is found pure and cultures are easily to be obtained in bouillon and on serum-agar. In the exudate of ulcerous lesions the bacillus may be associated with various species of diplo-, staphylo-, and streptococci.

However, the bacillus may be present only in very scanty numbers, and in such cases or where other organisms are present, the microscopical examination alone may not suffice, and it is then necessary to make cultures on serum-agar.

Atypical forms of the Disease, in each of which the diagnosis was established or confirmed by the detection and isolation in culture of the Bacillus of Preisz-Nocard (B.P.-N.).

It does not seem necessary to give a list and details of the findings of the B.P.-N. in the typical so called "leg-form" of Ulcerative Cellulitis cases, that is, where the lesions occur and the disease remains more or less localised in the regions below the hock or knee. It is sufficient to state that the bacillus was obtained from the pus collected from a great number of such cases, that cultures of the organism could always be obtained on serum-agar media when the pus was taken from typical

ripening, unopened abscesses or pus nodes, that such cultures were usually pure, and that the inoculation of a pure culture into the skin of the legs of normal experimental horses always produced typical leg lesions of the disease.

Some examples of more or less atypical forms of the disease are given below :—

1. Two ulcers discharging and purulent, and about 10 dried or cicatricised on off hind leg below hock. An abscess inside of off thigh. An abscess behind near shoulder. Two small abscesses near side of neck, one large and one small on off side of neck, and one abscess in the prepectoral region. Mallein reaction negative; horse destroyed.

Post-mortem finding.—Abscess inside of off groin, another just behind sternum, and a large fistulous abscess between sternum ribs, and near fore leg. Spleen, liver and heart normal; kidneys: multiple small abscess in both: lungs: several small purulent foci. Pure cultures of B.P.-N. were obtained from each sample of pus collected from thigh, neck, shoulder, kidneys, and lungs. The bacillus was also noted in the pus by direct microscopical examination.

2. No "Leg lesions." First abscess appeared over point of off shoulder. It was treated surgically and was healing. A second small abscess appeared 11 days later at the back of the thigh and a third large abscess formed over point of hip. Pus from this last abscess gave a pure culture of B.P.-N. The horse rapidly became emaciated, and passed small quantities of blood in the urine.

Post-mortem findings.—Paranephritic abscesses of both kidneys and a purulent inflammation of the bladder and vagina. Pure cultures of B.P.-N. were obtained from kidney pus.

Experiment.—A normal experimental horse received an inoculation of a culture of this strain under the skin of the fetlock. An abscess formed there and ripened in 4 days. By the end of two weeks 13 lesions had developed in the infected limb, the most recent being towards the groin. Cultures of B.P.-N. were again obtained from the pus, some pure, others mixed with a staphylococcus.

3. Groups of multiple small abscesses hips and shoulders, and on facial region of head. Also one large abscess measuring 7 inches by 4 inches behind the poll. The animal was very debilitated and emaciated.

Pure cultures of B.P.-N. were obtained from the pus of the large poll abscess and from one of the small shoulder abscesses.

From one of the facial abscesses, the B.P.-N. was obtained, together with a gram-negative streptococcus.

4. A large isolated abscess in the region of the triceps muscle, near shoulder, and another under the vulva, were followed by typical lesions of Ulcerative Cellulitis on off fore limb below the knee. Pus from large isolated abscess gave a pure culture of B.P.-N.
5. A large abscess on left side of the back and a smaller abscess on left side of chest. Pure cultures of B.P.-N.
6. A chain of small ripening buds in the prepectoral region. No other lesions. Pure cultures of B.P.-N. obtained from the pus.
7. Multiple small abscesses on neck and shoulders. Cultures of B.P.-N., also a diplococcus and a streptococcus.
8. Small abscesses on skin of abdomen. Pure cultures of B.P.-N.
9. A single abscess on the inside of thigh. No ulcers or any history of Ulcerative Cellulitis. The pus gave a pure culture of B.P.-N.
10. An abscess in the inguinal region and two nearly healed ulcers near the hind fetlock. Pure culture of B.P.-N. from inguinal abscess.
11. Purulent discharge from knee and hock following ulcerous lesions below. Cultures of B.P.-N. from knee and hock together with streptococci and staphylococci.
12. Sero-purulent discharge from a thickened hock. No other lesions on limb or body. Direct microscopical examination showed strepto and diplococci. Cultures: B.P.-D. associated with the other organisms.

The foregoing are but single examples. Similar cases have been examined by the same method and with similar results.

Treatment.—In many cases the ulcers will heal up under simple forms of antiseptic treatment. Nevertheless, the disease is prone to recur and progress, abscesses and ulcers continuing to develop. Applications of tinc. of iodine, solutions of potassium permanganate, or prolonged irrigations with normal saline solutions are all beneficial, and preferable to the use of strong caustics and astringents and the heroic measures that are sometimes employed, but a permanent cure by any such means is the exception rather than the rule. Intravenous and intramuscular injections of Lugol's solution, silver and mercurial salts have been tried with but little, if any, better success. More favourable results are being obtained by vaccine methods of treatment.

VACCINE THERAPY.

The preparation of autogenous vaccines for the large number of horses admitted to the Veterinary Hospitals with Ulcerative Cellulitis is impracticable. A stock polyvalent vaccine is therefore employed.

Method of Preparation.—Pure cultures of the Preisz-Nocard bacillus are obtained on serum-agar from the pus of abscesses occurring in typical and atypical forms of the disease. These are subcultured at 24-hour intervals until a prolific growth is obtained. Large flat flasks or bottles of serum-agar are then richly sown from selected subcultures and after 24-48 hours the growths are removed in sterile normal salt solution, passed through sterile gauze to remove any small pieces of agar, and centrifugalised. The bacterial sediment is then taken up in a mixture of equal parts of alcohol and ether, or in pure acetone, in which it remains overnight. The precipitate is collected in sterile Petri dishes and placed in a drying oven heated at 400 to 450 deg. C. The mass dries into hard, brittle yellowish-brown flakes which is reduced to a very fine white powder by prolonged grinding. To make a stock vaccine, a 1 per cent. suspension of the dried bacteria is made in a sterile glycerinated carbolised saline solution (glycerine 20.0, Ac.carbol. crystals 0.25, sodium chloride 0.25 per 100 c.c. distilled water), which is added to the powder a little at a time in a sterile glass mortar and thoroughly triturated. Needless to say every detail of technique is carried out under the utmost possible sterile conditions. The stock vaccine is exposed to a steam temperature of 100 deg. C. for 2 minutes, then diluted with an equal volume of the aforementioned dilutant, making a 0.6 per cent. suspension, 1.0 c.c. of which contains 0.005 grammes of dried bacteria.

The dosage and frequency of injection has been worked out by many trials and experiments, the following system of vaccine treatment being recommended :—

A.V.C. BACTERIOLOGICAL LABORATORY, B.E.F.

ANTI-PREISZ-NOCARD VACCINE.

For the Treatment of Ulcerative (Lymphangitis) Cellulitis.

Vaccine treatment commenced at the onset of the disease will usually result in a cure within a month. The efficacy of the treatment varies in accordance with the general condition of the animal, the type, stage and duration of the disease, the co-existence of secondary infections, and such sequels as ankylosis, elephantiasis, etc., and, most important, whether the treatment is commenced early or is delayed.

DOSAGE RECOMMENDED.

1. When the specific infection is a quite recent and local one, begin with a dose of 1.0 cc. increasing by 0.5 cc. for each subsequent dose at seven days' interval over a period of four weeks. Thus :—

1st dose	..	..	..	..	..	..	1.0 cc.
2nd dose on the	7th	day	following	..	..	..	1.5 cc.
3rd	..	..	14th	..	..	..	2.0 cc.
4th	..	..	21st	..	..	..	2.5 cc.
5th	..	..	28th	..	..	..	3.0 cc.
							10.0 cc.

2. When the disease is well-established, chronic, or recurrent, begin with a dose of 2.0 cc. and increase as follows :—

1st dose	..	..	..	..	..	..	2.0 cc.
2nd dose on the	7th	day	following	..	..	..	2.5 cc.
3rd	..	..	14th	..	..	..	3.0 cc.
4th	..	..	21st	..	..	..	3.5 cc.
5th	..	..	28th	..	..	..	4.0 cc.
6th	..	..	35th	..	..	..	5.0 cc.
							20.0 cc.

The reactions are almost entirely local—the thermal and general reactions, if any, are slight; 12-24 hours after inoculation there will be some œdema and tenderness; this local reaction will become less marked at the subsequent inoculation. In exceptional cases the reactions to the first and second doses may appear either too severe or too slight; in such cases the above dosage should be governed accordingly, reducing or increasing as indicated by the local reaction.

The vaccine method of treatment is *contra-indicated* in cases of marked debility. The object of the treatment is to excite the defensive mechanism of the animal body to a specific anti-body formation, and the success of the treatment depends upon the manner in which the defensive forces respond to the attack—the artificial introduction of the bacteria and their derivatives—and put forth a counter-attack in which the bacterial elements of the disease are destroyed. But in the case of an animal whose normal defence is already greatly weakened by bad general health and a poorly nourished state, the injection of vaccine may only result in further reducing the defence or in overcoming it and aggravating the disease.

Whenever the treatment is applied to an animal in poor flesh,

the initial dose should be a smaller one and the ascent more gradual than in the dosage indicated above.

In chronic cases, or where secondary, infections, staphylococci and streptococci, are suspected, a dose of *Polyvalent Mixed Vaccine* may be given midway in the intervals between the inoculations of Anti-Preis-Nocard Vaccine.

It is essential that horses be well exercised during the whole course of vaccine treatment. When lameness has disappeared and the lesions are healing, light work tends to hasten and complete recovery.

The ampoule of vaccine must be thoroughly shaken before the small end is broken off immediately before aspirating into the syringe, so that the bacterial sediment is in even suspension.

Sterilise the hypodermic syringe and needle by boiling.

Inject the requisite dose subcutaneously on the side of the neck, alternating from one side to the other, and taking all necessary precautions to ensure sterility.

The local treatment of ulcers and abscesses should consist of frequent irrigation with normal salt saline. Caustics and strong disinfectants are to be avoided during vaccine treatment.

The preliminary experiments with the vaccine method of treatment were as follows:—

VACCINATION AFTER INFECTION.

Two horses were inoculated under the skin of the fetlock with a virulent culture of the bacillus of Preis-Nocard.

1. Typical ulcerous abscesses formed between fetlock and hock. Vaccine treatment was commenced on the 10th day of the disease. The 5th and last ulcer was healing well on the 30th day of disease. Vaccinations were continued for another month, the animal receiving 8 injections in 8 weeks.

The lesions healed completely. The animal has since been under observation for three months, and there has not been any recurrence of the disease.

2. Typical ulcerous abscesses formed, as in the preceding case. Vaccine treatment was commenced on the 13th day of the disease. Five injections were given over a period of 4 weeks, in which the ulcers healed completely. There was no recurrence of the disease during the following three months of observation.

VACCINATION BEFORE INFECTION.

1. Three injections of vaccine in 2 weeks, followed by an inoculation of a virulent culture in the 3rd week, under skin between fetlock and hock. A very small purulent node formed in 4 days and broke,

discharging a little pus. Healing was rapid, and no secondary lesions or further progress of the disease developed.

2. Two injections of vaccine within 7 days, followed by an inoculation of a virulent culture under skin of neck. A small abscess formed, discharged a little pus on the 4th day, and healed rapidly; no secondary lesions or further progress of disease.

These two experiments indicate that vaccination may possibly be employed as a prophylactic with good results, but sufficient work on that line has not been done to permit of a definite conclusion.

The following table shows the summary of results of vaccine treatment in several series of cases:—

TABLE: SHOWING SUMMARY OF RESULTS OF VACCINE TREATMENT IN
ULCERATIVE CELLULITIS.

No 6 V.H.		No. 19 V.H.		Ind. V.H.	Total	Remarks.
Series	1st.	2nd.	3rd.	4th.	5th.	
Percentage cures:	73·3%	52%	60%	77%	49·1%	57·6%
Cured ..	11	26	30	54	82	203
Died ..	—	1	—	1	2	4
Destroyed ..	4	13	—	1	42	60
Cast ..	—	3	17	10	14	44
Transferred ..	—	—	—	—	15	15
Remaining for Treatment	—	7	3	4	12	26
Total ..	15	50	50	70	167	352

RESULTS.

It is very difficult to arrive at a definite conclusion as to just what vaccination can accomplish in this disease. On the whole, it has unquestionably done much good. In many cases the results have been truly remarkable, cures being established in a comparatively

short time. On the other hand certain cases, clinically almost identical with some of the cases in which a speedy cure was effected, have responded to vaccination poorly. As a rule, the earlier in the course of the disease that vaccine treatment is commenced, the better and quicker are the results. In the very advanced chronic recurring cases, the treatment may fail entirely. Individual cases vary in results, as they do in every known form of vaccine treatment, and it is evident that we have much to learn regarding the offensive and defensive interactions of the body cells and the conditions that most favour the production of specific antibodies against a specific antigen.

The difficulties in arriving at conclusions as the result of the above system of vaccination in several large series of animals so treated have arisen in consequence of (1) absence of history and knowledge of the duration of the disease in the majority of cases; (2) the constant culling out of horses from these series after they had received only one, two, or three vaccinations, for destruction, or to be cast and sold, frequently on account of age, debility, mange, etc., as being of no further military use, and not solely on account of Ulcerative Cellulitis, from which many of the cases were recovering or had responded well to vaccination; (3) an unfortunate selection of the type of cases, some being included that had been subjected to various forms of treatment without success, and were given vaccination as a sort of forlorn hope; and (4) delay and interruptions in the course of the treatment.

The percentage of cures would have been considerably higher than that indicated in the foregoing table, namely 57·6 per cent., if many of the animals cast, destroyed, or sent to the horse abattoirs for various reasons apart from Ulcerative Cellulitis, were left out of the calculations on which the percentage is based, as they should be. It would be safe to say that at least 25 per cent. of the animals destroyed or cast responded well to vaccine treatment, and that another 25 per cent. were so far advanced in the disease that their case was hopeless from the commencement of vaccination. It will be noted that out of 352 animals treated, 203 were cured, the other 149 being accounted for as: died, 4; destroyed and cast, 104; transferred and progressing favourably under further treatment, 41. We may say, therefore, on the grounds indicated, that in 50 per cent. of these 149 animals vaccine treatment was proving successful, and by adding this 50 per cent. (*i.e.*, 75 cases) to the 203 cured, that vaccination was more or less successful in over 75 per cent., and more or less failed in less than 25 per cent. of the cases treated.

The officers who have carried out the above treatment, after a previous experience of surgical and antiseptic methods, often the most heroic, speak unhesitatingly in favour of vaccination.

A.V.C. BACTERIOLOGICAL LABORATORY, B.E.F.
D.V.S., B.E.F.

Herewith is a brief summary of the work of the A.V.C. Bacteriological Laboratory, dating from its installation in March, 1917, up to July 31st, 1917.

The greater part of the month of March and part of April were chiefly spent in obtaining and setting up the necessary laboratory equipment.

The investigation of Ulcerative Cellulitis was commenced in March, and has been carried on up to date; a full report on this disease is now submitted. The nature of the disease has been thoroughly established, and considerable information gained with regard to its pathology and treatment. Especial attention has been given to vaccine methods of treatment, and a vaccine is now prepared and distributed from the laboratory which, from the reports received, affords a satisfactory method of treatment in cases where vaccination is indicated.

To meet the demands for a mixed infection vaccine, for the treatment of suppurating wounds, fistulæ, poll-evil, etc., a polyvalent mixed vaccine is prepared at the laboratory and distributed. The demand for this vaccine is constantly increasing. Up to July 31st, 6,370 doses of anti-Preisz-Nocard vaccine and 6,910 doses of polyvalent mixed vaccine had been sent out. A total of 13,280 doses.

The laboratory has not been equipped for the preparation of vaccines on a large scale. The present rate of output cannot be increased, or even maintained, without further facilities being afforded.

A REPORT ON CONTAGIOUS NECROSIS IN THE HORSE.

By LIEUTENANT L. E. PRICHARD,

Army Veterinary Corps.

In all I have had 43 cases of Contagious Necrosis under treatment, the first case being admitted on the 21st November, 1916, and the last case on the 19th December, 1916.

The disease has not run a regular course, but has assumed the following forms.

Form I.—This was the most frequent form, the majority of cases starting from rope galls. The horse on admission was suffering from galled heels which, for some days discharged a yellowish viscid fluid with a very foetid odour. It resisted all applications, and within a week of admission the whole of the skin of the heel sloughed, leaving a raw, angry surface, which granulated very slowly. In three cases the slough was so extensive that the back of the *os sufraginis* was exposed. This form is well shown in illustrations 1 and 2. It is needless to say that the patients with these sloughs were dead lame.



The hind heels were usually affected, and the horses appeared to slightly lose condition.

Form II.—In two cases, without any previous wounds, the *ergot* at the back of the fetlock became moist and sloughed out, leaving a rather deep suppurating crater. Owing to their situation these ulcers were very difficult to heal, as the movements of the patient tended to keep the wounds open. Leading from these ulcers the skin over the back of the flexor tendons became under run, fissures formed, and became suppurating sores, which gradually developed into ulcers with hardened edges.

Form III.—This began as a severe thrush and soon the leg swelled up as in lymphangitis. The lymphatics became corded, and buds appeared on their course, which formed into large deep abscesses and burst. These abscesses discharged a yellowish fluid, and at first somewhat resembled epizootic lymphangitis, but the *cryptococcus* could not be found in the discharge, and once the abscess healed there was no tendency to recurrence. It really was a toxæmia, the patient being constitutionally affected, showing increased respiration, pyrexia and loss of appetite. There was evidence of great pain, the affected limb being held in the air.

Illustration No. 3 shows a typical abscess four days after bursting. That the abscesses in this form did not always follow the course of the lymphatics is shown in illustration No. 4, where they formed a complete circle round the fetlock.

In two cases horses were admitted with brushing marks. These patients on the third day each developed a single abscess in the inguinal region. Unlike those in Form I these abscesses healed rapidly with profuse granulations.

In other instances, the bulbs of the heel became affected and sloughed. Later the lateral cartilage became involved, and the case was then virtually a quitter (illustration No. 5). In still more serious cases the infection extended, the coronet became puffy, and burst at various points, resulting, in two cases, in the hoof being shed and the patient having to be destroyed.

The following is a typical case which developed symptoms of pyæmia. The patient was admitted suffering from a slight rope gall. The following morning this had a most foetid odour, resembling seborrhœa, which could be smelt all over the stable. The horse was in great pain and continually held its leg in the air. Large beads of yellowish fluid stood out all over the heel. Within 48 hours there was a distinct line of demarcation running round the skin of the heel, and in less than two days the skin separated, leaving an angry surface. During this time the leg had swollen to three times its normal size. Then the

lymphatics became corded, and three large abscesses formed and burst in the region between the fetlock and the hock. As soon as these abscesses were evacuated, the animal was relieved and began feeding better. The case steadily improved, and was finally discharged to duty. The only blemish was a permanently enlarged leg.

Treatment.—Owing to the various forms of disease assumed it was impossible to have one fixed line of local treatment; but one line of internal treatment was carried out in all cases. On admission the patients were purged with aloes, and fed on bran until the action of this medicine had ceased. They were then given the following course:—*Acidum arseniosum* 8 grains, *hydrargyri iodidum rubrum* 5 grains, the dose being gradually increased daily, until at the end of a fortnight they were receiving *acid. arsen.* 15 grains, *hydrarg. iodid. rub.* 10 grains, and then the doses were gradually decreased, finally stopped for a week, and then restarted. This treatment appeared to have a marvellous effect in promoting the healing of the wounds.

The external treatment varied according to the case, but the following were the chief methods:—

(1) The cases which began as rope galls.

These were first washed in a 5 per cent. solution of *zinci Chloridum*, dried, and painted with *tinctura iodi*.

I tried various other disinfectants, *Eupad* and *Eusol*, and dry dressings of *zinci oxidum*, *iodoformum* and *acidum Boricum*; but I found the chloride of zinc and iodine far the best.

When abscesses formed they were syringed out with 1-1000 solution of perchloride of mercury.

(2) Cases which began as thrush.

The horn was well pared away and the frogs were treated in the ordinary way with copper sulphate or a mixture of copper and zinc sulphates. The cases which developed quittor were operated on and the lateral cartilage removed.

The cases were considered to be contagious and were carefully isolated. All standings were carefully disinfected and instruments sterilised.

I am greatly indebted to Captain G. A. Kelly, A.V.C., Divisional Veterinary Officer, 5th (Mhow) Division, for much valuable help during the early stage of this outbreak.

The average length of time the cases discharged to duty were under treatment was 49.6 days. The cases destroyed were in hospital on an average 47.2 days and comprised 14 per cent. of the admissions.

THE USE OF ARECOLINE HYDROBROMIDE IN THE TREATMENT OF COLIC.

By CAPT. C. E. W. BRYAN, *Army Veterinary Corps.*

AFTER having successfully treated upwards of about 400 cases of colic in this country in various classes of horses and mules, I cannot but recommend the most useful and efficient drug we have in arecoline hydrobromide. Before I came out to this country, I used to give $\frac{1}{2}$ and 1 gr. doses and my results were not always very satisfactory. Now I always give, with few exceptions, 2 gr. doses, even to cobs and light riders. Below this dose one is apt to be dissatisfied with the results.

The only times I do not use it are in (1) very mild cases of colic; (2) cases with very weak pulse and debility; (3) cases of acute tympany; (4) cases of diarrhoea and exhaustion.

I am quite aware that there are many cases which a dose of ammonium carbonate or chloral hydrate puts right in a short time, but very often these two drugs do not give the desired effect.

In other cases something else has to be done. I never hesitate in these cases to give gr. ii arecoline hydrobromide hypodermically and \mathfrak{ss} ammonium carbonate, the ammonium carbonate to be given first, as the arecoline causes more pain and a lot of salivation, which renders balling difficult.

The arecoline generally begins to show its effects in from 3-10 minutes by copious salivation and increased uneasiness. Occasionally trembling of the fore legs and shoulders occurs. The salivation generally lasts about $\frac{3}{4}$ to 1 $\frac{1}{2}$ hours; seldom more than two hours. Fæces are usually passed, at first hard, in about 20-45 minutes, becoming softer and softer until generally they are fluid.

Relief of pain generally occurs in about 1 $\frac{1}{2}$ -2 hours. I have seldom seen any alarming effects following its use. Occasionally one gets an acute attack of super-purgation lasting three-four hours. If it continues more than three hours, I give 4-6 grains of morphine, which always has the desired effect.

In cases of colic with great pain, chloral hydrate \mathfrak{ss} in bolus is of great help. In addition to quietening the pain, it prevents tympany, and does not appear in any way to interfere with the action of the arecoline. In cases of impaction, ammonium carbonate and strychnine gr. i is of great benefit, the latter acting as a general stimulant and increasing the action of the arecoline.

Generally one dose of arecoline is sufficient, but I have many times given a second and even a third dose. In these cases I give 1 gr. and never until three hours have elapsed without much effect from the first dose. I have begun to look upon arecoline as a valuable

prognostic agent. If it acts well and causes copious salivation, one can rest assured that the case will recover. In all cases where the animal has died the arecoline never acted well and scarcely any salivation was observed. In all cases which ended fatally, strangulation of bowel was found on *post-mortem* examination.

The advantages in arecoline are—

- (1) Rapidity of action and therefore rapidity of result. If the animal has already a strangulated bowel it kills him quicker.
- (2) Rapid purge.
- (3) No nausea or disturbance of appetite.
- (4) All effects of the drug disappear after four hours.
- (5) Small bulk to carry, especially when one is on the march.

In my opinion, with arecoline, strychnine, ammonium carbonate, and chloral hydrate, all cases of colic, except those due to obstruction of the bowel by strangulation, calculi, etc., have every chance of recovery. My percentage of losses has been very small, and every fatal case on *post-mortem* examination has showed strangulated bowel.

A NIGHT TREK THROUGH THE "FLY" BELT.

By LIEUTENANT H. E. H.,
Army Veterinary Corps.

MONZI HILL is a conspicuous landmark in that part of Portuguese East Africa. It is a great, grey granite kopje crowned by an enormous boulder. One side of this boulder is hollowed out into a cave, in which, so I have been told, lie the bones of chiefs. It may be so, but, as I was much more interested in the fresh game spoor that existed in the native gardens at the foot of the hill, I did not trouble to investigate the truth of the statement. Besides, a daily shade temperature of 90 degs. F. or more does not incline one towards unnecessary exercise.

We were riding transport between a place in North Rhodesia and another on the Zambesi. There were two of us, a Dutch conductor and myself—that is there were only we two white men—but we had plenty of natives with us—drivers, leaders and brake-boys. The conductor was in charge of ten waggons, each drawn by a span of twenty oxen. We were carting tobacco, each waggon having a load of two to three tons. The road is about 250 miles long, and many are the natural difficulties to be overcome when journeying along it; but hills, rivers, deep sand, etc., are trifling obstacles compared with the "fly-belt" that occupies the fifty miles between the Luia and Chiritsi rivers.

Ordinarily, when travelling in fly-free country, the routine of ox-transport is somewhat as follows: During the day the oxen graze and

rest. Towards sundown they are inspanned, and one makes an evening trek of four to six hours. Arriving at a suitable place, the waggons are drawn up four or five abreast, and the oxen are released from the yokes, but remain attached to the trek-touws. The hour for the morning inspan depends on the distance to be traversed before one arrives at a place suitable for the day's outspan, timing it so that the oxen will all be out of the yokes and grazing before the sun is hot. When negotiating a "fly-belt," however, the rules are to travel only during the darkest hours and to get through it as quickly as possible. If the belt is less than twenty miles wide, and the going is good, one can rush it in one night. If one cannot get through in that manner, one must make arrangements for guarding the cattle from tse-tse during the daylight hours. In our case there had been erected, at intervals, large, dark sheds, in which the oxen could be housed by day. At the base of Monzi Hill was one of these sheds, but between it and the next—on the Luangwa River—there were twenty miles of road, fairly level but very sandy. This long trek was necessary on account of the absence of water between the two places.

The previous night's journey had been an easy one, and the cattle were safely housed several hours before daylight. During the day the cattle were fed on dry mealie stalks that we bought from neighbouring villagers, at the rate of ten bundles, of 50 lb. each, for 1 yard of calico. The shed was as dark as is consistent with fair ventilation, and housed therein the cattle were safe from "fly." In the immediate neighbourhood of the shed the bush had been cleared, and there were very few tse-tse flies, so that it was not necessary to wait until it was quite dark before we let the cattle out to water at some pools, a few hundred yards away from the shed.

By the time the oxen had finished drinking, the sun had set, and before we had completed inspanning the last trace of daylight had disappeared; the moon was not due to rise for several hours. In order to take every precaution we did not even light a lamp, but depended entirely on the starlight for seeing the road.

Our first delay was occasioned by a tyre becoming loose, necessitating the cutting and driving in of wedges. It was a hind tyre, too, so for the rest of the trip the work of the brake-boy of that waggon was augmented, for it is very difficult to apply a brake effectively when there is a bulge in the tyre.

The deep sand made the going very heavy, so that in spite of the best efforts of the drivers the pace was only two miles an hour. Then further delay was caused by having to double-span the waggon across a bad, dry drift.

About 2 a.m. the moon rose. Our anxiety was now great. We

had come about twelve miles, and were in thick "fly," and, as is well known, tse-tse bite readily by moonlight. So far as that goes they will bite readily on dark nights if they are disturbed by an animal brushing past the herbage in which they rest; but they cannot see to fly to their prey unless it be light. The oxen were tired now, yet we dare not spare them, and we were forced to urge them with voice and whip to get greater efforts. Anxiously we wandered up and down the slowly moving spans, looking to see if any of the cattle were switching their tails—although, as we learnt later, this is no true index of whether the cattle are being bitten or not, because on this occasion we saw no switching, yet many oxen went down later with trypanosomiasis contracted now.

I have said that the distance between the two sheds was twenty miles. The last three or four, however, were practically fly-free, but before we reached this safe part morning came. I was a bit ahead of the train when the sun rose, and I was standing waiting when I heard a familiar buzz, and a tse-tse alighted on my shirt. Then another arrived, and I realised that if the oxen were receiving the same attention we were "jolly well in the soup." While so thinking, the first waggon passed me. The oxen looked played out, as well they might, seeing that they had been travelling practically continuously for eleven hours. The great-hearted ones of the span were bending gallantly to the yokes, although their breathing was stertorous, and the jugular veins stood out like ropes on their necks. The faint-hearted oxen were looking despondent, pulling only when their names were shouted or the lash fell across them. The voorlooper was shuffling along, and the driver looked ready to drop with weariness, and his voice was hoarse and cracked. I saw no flies on this span, but as I passed to the rear of the waggon one alighted on me. I had not the heart to stop with the poor, wretched oxen, so I pushed on by myself to the Luangwa River, and there I waited.

At last they arrived. One driver had practically fainted, and was riding on his waggon, but the rest were still shuffling along in their appointed places by the side of the oxen. The conductor looked haggard and was as dust-laden as it is possible for a man to be. Oh, the relief of hearing that "Wa, now!" and the pleasant grinding of the brakes. The yokes were cast off, and, regardless of stray tse-tse flies, weary oxen and wearier men plunged into the cool, still water.

THE FOREST FLY.

By THOS. B. GOODALL, F.R.C.V.S.

Christchurch.

THE name by which it is known among scientists is "*Hippobosca Equina*." It is pupiparous, *i.e.*, instead of laying eggs as, most other

insects, the single egg is hatched and the larva developed in the body of the parent, and just before the expulsion of the pupa the abdomen of the fly is enormously distended.

Its body covering is hard and chitinous ; the only way of killing it by hand is to squeeze it in the long axis of the body between the wings with the edge of the thumbnail, the lower part of the body being in the finger.

It never takes long flights, but short ones from one part of the body of the host to another ; if disturbed, it usually dodges a would-be catcher by going under the abdomen, or over the back, from one side of the body to the other. Occasionally, when being " chased," it will leave the host and settle in the garments. It is as well to have a man on each side of the horse when trying to catch them.

Its real habitat in the host is on the thin skin of the perineum, or between the thighs, and in these parts it undoubtedly " sucks" blood. Its proboscis resembles somewhat that of the glopina (tsetse fly). When it settles on any other part of the body it has a knack of crawling, generally side-ways, until it reaches the parts sought for, and it is when so occupied that it causes so much irritation and annoyance to horses not accustomed to them.

The feet are furnished with claws and suckers, enabling them to cling with great tenacity to the hairs of the host, and they cannot be dislodged by the swishing of the tail. An interesting demonstration of this clinging power may be made by taking one of the flies by the wings, then placing its feet in the hair on the back of the hand or on the arm, and raising the fly by the wings, it will drag the hair with it.

The only way to catch the fly is to dab the fingers quickly over it as it rests on the body, and then to draw them together, and it is secured. By any other method it eludes its would-be captor by flitting to the other side of the body.

In the New Forest in the hot months, both ponies and cattle may be seen with *swarms* of scores of the flies about the perineum, where, on removal, the marks of their " bites " may be seen by the oozing of minute droplets of blood.

FIBRO-MYOMA IN ABDOMINAL CAVITY OF RETRIEVER DOG.

By G. GAIR, M.R.C.V.S.

Conon Bridge.

THE subject, an eight-year-old retriever dog, was noticed by the attendant to be losing condition for several weeks, and the abdomen getting rapidly larger. On examining the dog, a large firm mass could be detected in the abdomen, and I concluded it was one of

those rapidly-growing tumours that had to be dealt with. The diagnosis being unfavourable, the animal was destroyed by giving a hypodermic injection of prussic acid. On *post-mortem* examination, a large rounded tumour was found weighing 13 lb. The mass was situated among the intestines and adhering thereto. On cutting into it the pink colour and cotton ball appearance of the cut surface gave the characteristic picture of a fibro-myoma. Sections from the tumour were prepared, and stained with hæmatin and eosin, and also with hæmatin and Van Giesen, the latter being a good stain for fibrous tissue. Microscopic examination showed bundles of non-striped muscle fibres running in all directions, some longitudinally, transversely, and others obliquely. The fibrous tissue is well seen between the bundles and individual fibres. It is on account of the fibrous tissue entering into the composition of the tumour that the term fibro-myoma is employed.

It is an intermediate condition between a fibroma and a myoma. Blood vessels with fairly well developed walls were seen, extensive hæmorrhages were present, and also necrosis (red softening).

This class of tumour frequently shows such changes, as well as calcareous degeneration. Two varieties of the tumour occur:

- (1) Rhabdomyoma, composed of striated muscle; it is not very common and is usually congenital, and more frequently affects the kidneys in human subjects.
- (2) Leiomyoma, the variety met with in this case; it differs from the former in only developing from pre-existing unstriated muscle fibre.

It occurs most commonly in the uterus (uterine-fibroid). It also occurs in stomach, intestines, œsophagus, broad ligament, and ovaries of human subjects, and has been known to weigh as much as 20 lb.

Translations.

THE METHOD OF USING ANTISEPTICS IN WAR SURGERY.

Professor Roux, dealing in *Academie des Sciences* with the question of the method of using antiseptics in the surgical clinique, expresses his ideas on the points summarised in Cazin's research, Cazin being a doctor in the Ambulance Section of the Polytechnic School who wrote in collaboration with Mmselle. Krongold. According to these authors the choice of the antiseptic to be used must depend on the genus of the microbe to be dealt with, for the microbial flora of wounds are very variable. There is no universal antiseptic, he

declares, effective in all cases. Roux insists on a definite plan, following the teaching of Cazin and Mmselle. Krongold, in the use of the most convenient antiseptics in different cases. Precise results, above all, depend on a careful examination of the microbial flora of the wound, and not on proceeding without method in the use of antiseptics.

The authors quote the exclusive action of Leclainche and Vallée's serum in the case of suppuration due to streptococci, and to the minor efficacy of the serum in the treatment of suppurations due to the anaerobes, such as *perfringens* or the septic vibrio accompanying anaerobic streptococci. In the treatment of infected wounds which contain flora, the bacillus pyoseyances or staphylococci predominating, associated with diverse diplococci, cocci, and other banal bacteria, the antiseptic solution of nitrate of silver of the strength of 1 in 200,000 has given the best results. — *Revista de Veterinaria Militar*.

G. M.

MAXILLARY OSTEO-SARCOMA.

By CLEMENTE MARTINEZ HERRERA,

Veterinary Surgeon to the 2nd Spanish Regiment of Mounted Artillery.

The horse "Philologist," belonging to the 5th Battery of the East Regiment, sorrel-coloured, and put aside to be cast, presented a tumour on the external left face of the inferior maxilla, 12 centimetres long and 9 centimetres broad, inserted into the inferior border of the maxilla up to $\frac{1}{4}$ centimetre from the molar arcade. The tumour had been treated by the ordinary procedure with caustics and resolvers without obtaining even minor advantage; the treatment was prolonged with a view of avoiding surgical intervention, a delicate proceeding in the anatomical region in which the neoplasm was situated. As no result was obtained, extirpation was decided on.

The horse was put on a Vinsot's table, the region was disinfected and anæsthetised locally with cocaine adrenolin, and, under the direction of Professor Coderque, an incision was made in the skin in the direction of the long axis of the tumour, and dissecting the skin on both sides until the base of the tumour could be ligatured, a strong cord was passed through the middle of the tumour and slip-knotted at both extremities which much facilitated nucleation. By its inferior face the tumour was intimately related to the external maxillary arteries and veins and to the tongue, which were perfectly isolated without ligaturing. The base of the tumour was inserted into and adherent to the maxillary bone. Stenson's duct, which wound round the inferior border of the tumour, was dissected out

with great care. At its anterior part the tumour was extirpated with ease. The edges of the wound were levelled, the superfluous skin cut away, a drainage tube inserted, and anæsthesia kept up with ethyl chloride. External protection was given to the wound by means of a Mayor's bandage.

For the subsequent nine days after operation, the cavity suppurated profusely; as an application twice daily nothing else was used but boiled water and seroform, protecting the wound with an external antiseptic, curtailing the suppuration, and the horse, which was operated on on August 11th, only had a cicatrix at the place of operation on August 28th. The extirpated tumour weighed 167 grammes, was of smooth consistency, like an apple with ossified and hard granular portions. Section through the middle showed a greyish, yellow cortex, with broken down alveoli containing opaque reddish liquid.

Microscopic examination showed a smooth and abundant ground substance distributed in zones of varied hardness, as in the cortex; also embryonic rounded and oval, voluminous and polynuclear cells in some parts in process of calcification. The tumour was an osteo-sarcoma.—*Revista de Veterinaria Militar*.

G. M.

PIROPLASMOSIS EQUINA.

By TAHUER.

AMONG the injuries favoured by the actual war in Europe is the propagation of various epizootics; a few had ceased to exist in some countries, others that were disowned are appearing now; among these may be noted piroplasmosis equina.

In one zone of Russia, others of Turkey and others of Italy, it had been limited to certain areas, but the necessities of war and transport of all kinds of stock has extended the malady into regions in which it was formerly only referred to as of the past. Markoff believes that the presence of piroplasmosis equina in the Balkans has risen in importance to that of Southern Russia; Kubitz accentuates the presence of the epizootic in Bulgaria; Carpano has noted the propagating in Italy of two distinct forms, due to the presence of different parasites. Up to the present we have only known (and fortunately we have only considered it as an exotic and have made no extended observation of it in our country) the form described in the text-books under the name of babesiosis or piroplasmosis equina; for this reason we will only discuss the subject without making authoritative remarks on it. Carpano has studied the malady practically, and we believe it opportune to make a note of some of his observations.

He says that the most prevalent form in the Italian peninsula is "llamada nutaliosis" due to nutalia equi; it is most benign, its mildness being related to the altitude and extent of the marshy ground where it prevails, but it is most severe in the southern region. It is transmitted by a tick, the *rhhipicephalus bursa*, whose larva is infected with the blood of a horse attacked, and the adult tick becomes parasitic on the healthy horse. The clinical form develops afterwards as described subsequently, but is less grave and gradually dies away.

The other form of true piroplasmosis is transmitted by another ixode, the *margaropus annulatus*, which harbours the piroplasm known as *babesia equi* from the beginning of its existence; it is not infective as a larva, but is infected previous to transmitting the malady to a healthy animal.

Any of our horse stock may be invaded with the malady, and we advise our readers to become acquainted with the symptoms. According to Theiler (an authority on the matter) there are two forms—acute and chronic. The acute form manifests itself by fever, icteric mucosae with many reddish areas, icteric sclerotics, eyes watering, fatigue, depression, weak accentuated and venous pulse, extreme anorexia, polyuria, and great discolouration of the urine, rapid emaciation, with the emission of a disagreeable odour at any time before death, which occurs in five to nine days in all cases. The chronic form may cause death in a month or produce severe anaemia. As the parasite is harboured in the blood, this fluid must be examined for diagnosis. According to Bimbu, piroplasmosis may be combated with injections of quinine.—*Revista de Veterinaria Militar*.

G. M.

Abstracts.

COLIC IN A HEIFER.

By D. UDAIL and F. KOENIG.

A 2-YEAR-OLD Guernsey heifer, two or three months pregnant, was found uneasy by the owner at 11 a.m. From this time on she continued to be more restless and finally developed evidence of severe pain.

Symptoms 3 p.m. A heifer in fine condition is found lying down, breathing rapidly, moving the hind feet about, and grunting as if in pain. Enquiry shows that no manure has been passed since morning. P. 110 to 125. T. normal. On being made to rise she kicked almost continuously with both hind feet, and carried the tail twisted and between the legs; peristalsis suppressed. On rectal examination

a hard painful mass was felt deep in the region of the right flank ; on palpation through the rectum this mass was found to be very painful. It was an unmistakable case of intussusception. She was hauled to the college clinic in the afternoon, operated in the evening and eventually made a complete recovery. Before conception this animal was treated for sterility, but the intestinal disturbance had no bad effect on the fetus.

Colic in cattle may be due to a variety of causes, some of which are trivial and transient in character. Colic in cows is regarded by some as almost positive evidence of bowel displacement. While it is a prominent symptom in the early stages of some displacements it cannot be accepted as positive evidence when a rectal examination is negative. Complete suppression of the feces combined with a very rapid pulse is of more value in making a diagnosis of intussusception than the presence of colic. In most cases intussusception is easily recognised by a rectal examination.—*Cornell Veterinarian*.

CYSTITIS IN THE DOG AND CAT, AND TREATMENT.

By OSCAR SCHRECK,
New Haven, Conn.

Synonyms.—Inflammation of the bladder, catarrh of the bladder, irritable bladder, etc.

Idiopathic inflammation of the bladder is of rare occurrence. It most commonly originates either from traumatic causes or from irritation produced by irritating drugs, such as phenol, turpentine, cantharides, or of poisonous or infected matter, especially if long continued. It is an inflammation of the inner coat of the bladder, which usually spreads to the muscle, around the neck of the bladder and arises under very different circumstances.

The bladder is a musculo-membranous pouch that serves as a temporary reservoir for the urine. The bladder is situated in the pelvic cavity, where it occupies more or less space according to the quantity of urine it contains, and is formed of two membranes which compose its walls, the internal of which is mucous, and the external of which is muscular. Anteriorly, the latter is covered by the peritoneum. When the bladder is empty it is thrown into internal folds or wrinkles. The bladder is well supplied with blood vessels, lymphatics, and nerves. The odour of urine in the bladder is suggestive of ammonia. If turpentine has been given, it will be of a violet odour. The colour is yellow to dark yellow or pale when there is a greatly increased amount of urine passed. It is acid in reaction, but an alkaline reaction is generally seen in bladder diseases.

Cystitis may be acute or chronic ; I have never seen a case in

the dog or cat but that the history was one of irritation produced by drugs, following accidents, and by extension (catarrh of the urethra), or from the pelvis of the kidney to the ureter and thus involving the bladder.

Inflammation from blows or automobile accidents is seen more often if the bladder is distended, less often if the organ is empty.

Symptoms.—As soon as a few drops of urine collect, they excite so much irritation of the bladder that the animal makes frequent attempts at micturition, and passes only a small amount at a time. Little by little the urine becomes thick and turbid, accompanied by tenesmus and great suffering. The fluid is generally ejected forcibly or even spasmodically. Bowels more or less constipated, loss of appetite, rise in temperature may be severe; acute cystitis commonly degenerates into the chronic form of the disease if the cause is not removed, and may be followed by incontinence of urine. In the chronic form, the appetite is generally good, but the animal is of a very irritable, touchy disposition.

Treatment.—Inflammation, or catarrh of the bladder. The treatment in most cases is very simple after the underlying cause is removed, excepting those cases that follow accidents. Drugs indicated in the treatment are, buchu oil of juniper, linseed tea, boric acid, potassii citrate and acetate, acacia, balsam of Peru, salol, myrrh, and I find that sodii phosphate is the best remedy to restore acidity to the urine. The bowels should be kept open by giving the animal oleum ricini or equal parts of ricini and buckthorn, or saline. I am in favour of the latter. Mucilaginous substances mixed with food are good, if the animal will eat. I have obtained good results from its use in this manner (flaxseed, barley water), milk, soup, broth, beef tea, all are very useful. Triticum (dog grass) is to be recommended for its emollient and diuretic action in the treatment of cystitis or irritable bladder. It is to be given in the form of an infusion if possible; hyoscyamine is to be given if there is much pain or spasm; hexamethylenamine has been used by me with the best of results; Exercise should be allowed but not overdone. Of late I have secured the most satisfactory results from the use of the following:—

R

Potassii citratis	..	..	.. dr. II-ss
Spts. aether nitrosi	..	..	.. dr. IV
Formine	..	..	.. dr. I
Tr. hyoscyami	..	..	.. dr. I
Aquae menth pip	..	..	.. dr. I
Aquae menth pip	..	..	q.s... oz. III

M.

Sig. $\frac{1}{2}$ to one dram in a little water four times a day.

If there is great irritability the following formula is useful for the atonic condition.

R

Potassii citratis	..	..	.. dr. V
Potassii bromidi	..	..	.. dr. II
Tr. hyoscyami	..	..	.. dr. IV
Tr. belladonna	..	..	.. dr. I
Syr. simple	..	..	.. oz. I
Aqua distil	..	q. s.	.. oz. III

M.

Sig. One dram four times a day.

R

Fl. Ex. tritici	..	..	.. dr. II-ss
Tinct. belladonna	..	..	.. dr. ss
Sodii bicarb	..	..	.. dr. II

M.

Sig. $\frac{1}{2}$ to one teaspoonful in a little water every three or four hours.

The above are also useful in the treatment of this disease in the cat, but the dose must be reduced accordingly.—*Jnl. of A.V.M.A.*

DERMATO-MYCOSES IN CALVES.

JUAN VARAS CATAIA, *San Juan, P.R.*

WHILE inspecting calves in a dairy stable, property of Felix Rodriguez, at Bayamon, Porto Rico, my curiosity was aroused by many large greyish-white scabby spots, which had attained the size of the palm of the hand, and some even larger, on the neck, face and body of twelve calves. I removed some scabs, finding underneath ulcerous indentations filled with pus. The attendant informed me that the spots had been on said animals for a long time; that all kinds of treatment was given without results, and that he had contracted the same disease, curing himself with applications of tincture of iodine.

After I got through examining carefully every sick animal I realised that in order to arrive at a definite diagnosis it was necessary to examine microscopically material obtained from the diseased part. Therefore, with a scalpel, I collected some scrapings from the different animals in test tubes which were partly filled with chloroform, and had them shaken for a little while. After the chloroform was poured off, the sediment left was mixed with a 33 $\frac{1}{2}$ per cent. solution of sodium hydroxide; then the fluid sediment was mounted on slides, using

cover-glasses, and examined under a powerful microscope with a dry lens, finding a beautiful field of threads and spores of the *Tricoptomy tonsurans*, which, as is known, is the cause of herpes tonsurans.

I immediately ordered the separation of the diseased calves from the healthy ones, quarantined them, and recommended the treatment of the affected part with tincture of iodine.—*Journal of American Veterinary Medical Association.*

"SAND COLIC."

*Editor, Journal of the American Veterinary Medical Association,
Ithaca, N.Y.*

DEAR SIR,—Among the "European Chronicles," and under the head of "Sand Colic," I note an interesting little article in your March issue.

Evidently the author has heard of the condition "Sanded," or, possibly, has rubbed up against a mild case or two; but if he should visit Florida, I think he might still find a few cases of the real thing.

A few years ago, while we still used mules and horses as a means of transportation in this part of the world, it was quite common, and I still occasionally meet the condition among cattle. In cattle, the most common point of impaction is the omasum, and this will become a solid mass of cement, which surely kills.

Out of many cases I have three good *post mortem* demonstrations: two in horses, where the impaction was in a single loop of the small intestine. In one case the mass weighed 52 lb., in the other 70 lb., and the intestine was dilated to a foot or more in diameter. The third case was in a large gray mule which the owner said had been subject to mild colics for a year or more. When she was brought to me there was no trouble with a diagnosis, and I told the owner that nothing I knew of, except a long-handled shovel, would move the mass. My prognosis was a fatal termination, and she proceeded to die during the next twenty-four hours. On *post mortem* the cecum contained something more than 100 lb. of clear white sand, packed like cement.

One feature of these cases is that the food mass will, for a long time, pass over the obstruction. I have, on one occasion, recovered an ounce aloes bolus from the rectum that had been administered *per orem*, a day or so previously, and had not even dissolved.

With us it is not uncommon for any of the larger animals to get a habit of licking up sand, just as they would salt; and this is done where salt is kept constantly before them. In thirteen years' practice I have found only one successful method of treatment, and that is, prophylactic. A pound of whole flaxseed fed once each week to a

horse, mule or cow, and the owner can forget about "sand." In my experience, high and copious irrigation against such a mass as sand impaction forms is more than apt to result in a ruptured intestine, and I have found it better practice to let the animal die, if it has to, than to let the owner see you kill it trying to save.

FRED W. PORTER, D.V.M., Tampa, Fla.

Reviews.

EPIZOOTICS AND THEIR CONTROL DURING WAR. A GUIDE FOR ARMY, GOVERNMENT AND PRACTISING VETERINARIANS. By Dr. Herman Miessner, Hanover. Pp. 207; 37 illustrations. Translated by A. A. Leibold, D.V.M., Bacteriologist, Research Department, The Abbott Laboratories, Chicago. Veterinary Medicine Series, No. 15. Published by A.V.M. Publishing Co., Chicago.

This small book, the 15th number of the Veterinary Medicine Series brought out by Dr. D. M. Campbell, of the A. J. V. M., is a translation just published in order to be available for the veterinarians enlisted, and about to enlist, in the American Army. The text deals chiefly with equine diseases occurring in transport circles, but also touches on two diseases met with almost solely in cattle, viz., rinderpest and contagious pleuro-pneumonia. An appendix to the little volume deals concisely with the experiences of some American veterinarians who have been connected directly or indirectly with the handling of horses in the present world war. The book is divided into two parts. Part I deals with Horse Hospitals and Horse Depots, Blood Examination Stations, and Disinfection. Part II includes sections on Glanders, Anthrax, Rabies, Mange, Contagious Pleuro-Pneumonia of Horses, Catarrhal Influenza, Strangles, Dourine, Contagious Pleuro-Pneumonia of Cattle, and Rinderpest. The list of epizootics that may arise and have occurred in the present war does not seem to be by any means complete, but those discussed are fully dealt with. The contagious pleuro-pneumonia of horses is really the pectoral form of influenza as known on the Continent, but British clinicians have seen a sporadic pneumonia, occurring mostly in heavy horses, which causes great and quick losses, and which is not mentioned in this book. At any rate, the symptoms of this pneumonia are not those given as occurring in pectoral influenza. For this complaint the intravenous injection of salvarsan holds first place. Stress is laid on the marked symptoms of colic in cases of anthrax. The latest treatment of mange by SO_2 gas seems to easily beat the remedies by washing with green soap or 10 per cent. carbol-glycerin and subsequent application of anti-mange liniments as in this book. It is recommended to treat strangles with a powder composed of antimony sulphurate, ammon-chlorate, sodium sulphate and powdered liquorice root, given three times daily in the food. The chapters on contagious pneumonia and rinderpest are very useful ones. These diseases have often appeared in past wars, and the purchase by the Russians of animals from Mongolia and Manchuria makes danger from these sources obvious. The American experiences in the handling of horses for use in war deal

with the matter as connected with concentration camps or remount depots, and during transportation to the scenes of action. These pages are quite instructive. The little volume should be helpful to Army veterinarians, and useful to those engaged in preventing the introduction of disease into their own countries. As a result of British, French, Italian and American experience, however, we hope to see a much more comprehensive and equally concise work produced in the future, and advances noted all along the line in preventive and therapeutic measures.

G. M.

VETERINARY REVIEW. Editor: O. Charnock Bradley, M.D., D.Sc., M.R.C.V.S., Principal of the Royal (Dick) Veterinary College, Edinburgh. Issued quarterly; annual subscription, including postage, 10s. 6d. Publishers: W. Green & Son, Ltd., London and Edinburgh.

In an opening article with the significant title of "Cui Bono?" a writer under a nom-de-plume impresses on his readers the importance of science in the material and intellectual advancement of mankind. The contribution is a very apt and useful one at the present time. It is a thoughtful and well-written piece of work. Mr. Frank Chambers, A.V.C., F.R.C.V.S., discourses on "The Transmission of Animal Trypanosomiasis by Blood-sucking Flies other than Glossina."

The "Abstracts" section is very full, complete, and interesting, and touches on such important subjects as "Bacterial Necrosis," "Infectious Stomatitis," "Epizootic Lymphangitis," "Calf-feeding Experiments," "Physiological, Surgical and Parasitology Questions." The most recent thought and investigation on a wide variety of subjects is here summarised. There are nine reviews of recently published books which all appeal more or less to the veterinarian or agriculturist.

The "Notes" on Books is a very useful compilation, and forty-two pages of "Bibliography" indicate that material for this section is pretty extensively overhauled and noted.

The REVIEW is doing good work and ought to bring home to the veterinarian the necessity of keeping busy as a reader if he wants to keep abreast of the best thought on the many subjects connected with his profession.

G. M.

BOARD OF AGRICULTURE AND FISHERIES: ANNUAL REPORT OF THE CHIEF VETERINARY OFFICER FOR THE YEAR 1916. Published by H.M. Stationery Office at Imperial House, Kingsway, London, W.C.2, and 28, Abingdon Street, London, S.W.1; 37, Peter Street, Manchester; 23, Forth Street, Edinburgh, etc. Price 2d. net.

The scope of this Report has been reduced owing to war-time exigencies, but it is especially noteworthy because it deals rather fully with the treatment of swine fever by means of serum. There was only one outbreak of foot-and-mouth disease; this occurred in Somerset, and was soon got under control. The Swine Fever work and observations cover a period of twelve months, from September,

1915, to September, 1916. The acceptance of treatment by serum is at the option of the owner, and under it healthy pigs may be moved off infected premises for immediate slaughter, and other pigs usually treated with serum may be moved on for fattening purposes. It is gratifying to observe that the proportion of suitable cases in which serum treatment was accepted was 83 per cent., and during the twelve months serum treatment was applied in 2,100 outbreaks in which 77,900 pigs were involved. The total death-rate in these pigs amounted to 34.6 per cent. In outbreaks in which the serum treatment was not adopted, and in which 38,229 pigs were involved, the death-rate was 52 per cent. There was thus a benefit of 17.4 per cent. in favour of the treated pigs. Serum treatment being preventive and not curative, successful results depend on its early adoption before infection has spread. There is a diminished death-rate in suckers treated soon after birth, but the problem of their regular inoculation is a difficult one. Serum treatment has, however, taken all round, achieved very considerably better results at less cost than other methods previously tried.

Vaccination promises some advantage over serum treatment alone. By it the operator would act ahead of infection instead of following behind it. Pigs might thus be rendered swine-fever-proof for longer periods, but at present investigation in this direction needs carrying further in order that a suitable and safe method may be evolved.

Glanders shows a decrease of four outbreaks over last year. In Staffordshire there was an increase of seven outbreaks.

Five hundred and sixty outbreaks of anthrax were confirmed, and the animals affected comprised cattle, pigs, horse, sheep, fets, and one dog and one cat. The bleeding of animals and opening of carcasses were more prevalent than in previous years owing to owners' desire to save carcasses and use the meat, and as a result six human beings handling carcasses were affected, and the dragging of an affected carcase across one homestead led to the deaths of a horse, a goat, and four calves.

Sheep scab showed a considerable increase. Six-hundred and sixty-four tuberculous pigs were met with during swine fever operations, and 4,133 pigs were found to be suffering from swine erysipelas; 461,665 cc. of swine fever serum was manufactured at the Board's laboratory, and 991,000 cc. purchased from abroad, and 8,309 doses of anti-abortion vaccine were issued for trial as preventive inoculation.

Notice.

COLLOSOLS.

WE have received three samples of colloidal preparations from the Crookes Laboratories, 50, Elgin Crescent, London, W.

Colsolene contains silver in colloidal solution, and is very useful in cases of eczema, cracked heels, canker in the ears of dogs, and wounds.

Colsolene Paste may be heated and painted on wounds where there is danger of soiling or infection, and a bandage is not applicable. In

wounds of the coronet and bulbs of the heel, etc., we have found it useful and healing.

Colosylene Sulphur contains sulphur in solution, and may be given internally or used externally. The sulphur is in stable solution, and does not separate out. In this form it does not seem to upset digestion, and may be well used in canine practice. We have used it successfully in eczema and erythema of pet dogs.

Obituary.

WILLIAM C. BARLING, M.R.C.V.S.

MR. BARLING died recently at the age of 68. He graduated in 1868, and was a well-known veterinary surgeon, resident at the Paddocks, Newnham, Gloucester, where he had been in practice for nearly fifty years, following his father. He was a keen hunting man and splendid horseman, and rode regularly with the Berkeley hounds. He was the veterinary attendant for Berkeley Castle and the estate. Besides his English clients, Mr. Barling for thirty years held an appointment under the Dutch Government to examine and help to purchase all the horses for their Army. He was exceedingly successful in keeping up the standard of the horses, so much so that a few years ago he was commanded to attend Court at The Hague, and was presented to the Prince Consort and thanked for his services. Since September, 1915, Mr. Barling had been in very indifferent health, the loss of his only son in Flanders the previous March being a great blow to him.

NOTICES.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone : Gerrard 4646. Telegrams : "Baillière-Rand, London."

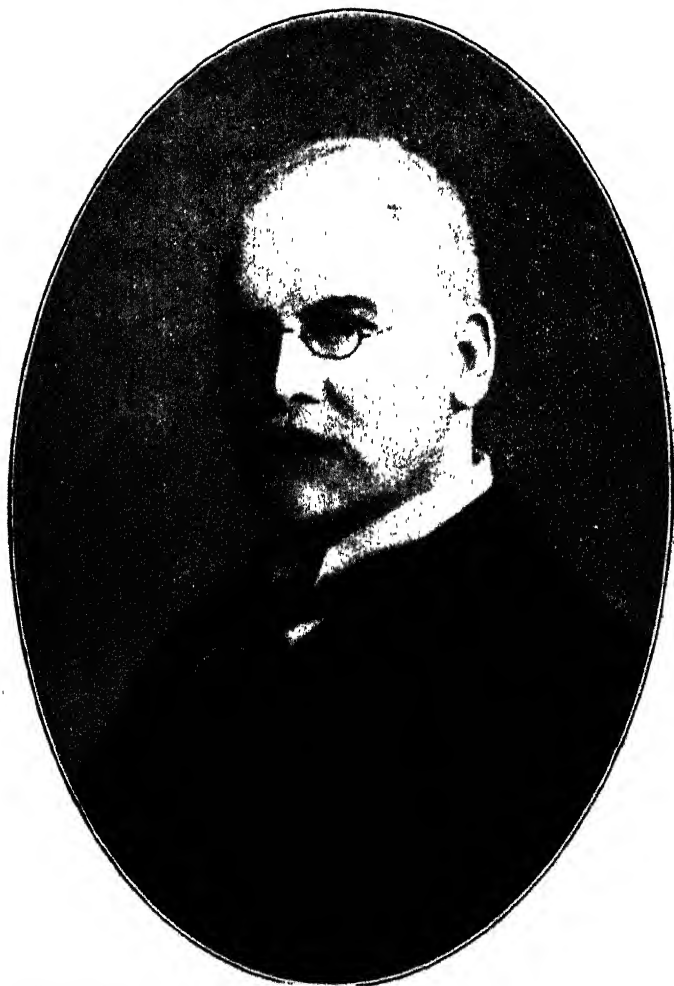
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Annual Subscription for the British Empire, 12s., post free; for the United States \$3.00; or combined subscription with the "Veterinary News" (weekly), 25s., post free. Owing to increased cost of production the "Veterinary News" has been from July increased to 3d. per copy; annual subscription, post free, 15s. inland and abroad.



THE LATE PROFESSOR A. E. METTAM, B.Sc., M.R.C.V.S.
Principal of the Royal Veterinary College, Dublin.

THE VETERINARY JOURNAL

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BRABANT (BELGIUM)

Sub-Editor :

GLADSTONE MAYALL M.R.C.V.S.

DECEMBER, 1917.

Editorials.

THE SHORTAGE OF VETERINARY SURGEONS NOW AND IN THE FUTURE.

THE question of an insufficient supply of veterinary officers for the Army is a very pressing one just now, and in order to supply them, unless more of the profession step into the gap, there will have to be some scheme devised whereby they can be got. Such a scheme seems to be possible on lines of mobilisation of the whole profession. Men up to a certain age—say 50 for home service and 45 for active service abroad—will have to be drawn in irrespective of all personal and individual loss, pecuniary or otherwise. The Mobilisation Board should have on it, in addition to the representatives of the Army Veterinary Department, representatives of the Board of Agriculture and the local County Councils—the latter on account of their value to know the animal wants of their respective districts. A proper mobilisation scheme would so redistribute the services of competent men that there would be no unnecessary overlapping and that very few districts at home would be without veterinary aid. Those, too, who had voluntarily joined the Army Veterinary Corps, together with those who had been “pulled in” as Territorials, would feel that those who were snugly ensconced at home in warm, comfortable houses would, at all events, be doing *their* bit towards a victorious completion of the war.

The Veterinary Colleges of the Royal College of Veterinary Surgeons might do much, too, to help if they followed the example of the French (Alfort) College in materially shortening the time for duration of the studies, and in so arranging the examinations that they take a man away from the active service he is undergoing for as short a time as possible.

Something will have to be done, both to carry on in the present and to provide for the future, and the sooner the Council of the Royal College wake up to a sense of their responsibility in this matter, the better it will be for the whole profession. Veterinary officers must be found in greater numbers, and veterinary students must be provided for the future supply of the profession. How are those two things to be done ?

THE VALUE OF HORSEFLESH AS A FOOD.

THE knowledge that the flesh of the horse is good for human consumption is no new thing, and the fact that we are in daily contact, both as Allies and foes, with nations who use it as a regular dietary makes one wonder why we Britishers, too, do not utilise it for the same purpose. Probably the chief objection is that of sentiment, for the proverb that "The horse is the friend of man," is very deeply engraved in us right from childhood.

Once this question of the sentimental side has been removed, the reasons why the horse should furnish us with good food are many, for no animal is a cleaner feeder. First and foremost is the one that the flesh is exceedingly nutritious, in addition to which it is sold at less price per pound than cow beef. It contains less fat than that of the cow, and this in itself should be a strong recommendation in the eyes of many who prefer lean beef. It cooks well, and thousands of people have eaten and enjoyed it under the impression that they were eating the best tender beef steak.

The flesh of the mule is even more sought after by the horse butcher than that of the horse, as its grain is finer and it is generally accepted by his customers as being of nicer taste and better quality.

Tuberculosis, and numerous other diseases so common in cattle, exist in such negligible proportion in the horse tribe as to be considered almost non-existent and there are no parasites present in the flesh itself as in the case of the pig and certain other animals whose flesh we eat with relish.

Given a proper veterinary inspection such as is carried out in France, Belgium, Denmark, Holland, Germany, and most European countries, there is very little to be afraid of in the way of disease transmitted by the flesh direct, and there is no question about it that our Allies (and our enemies, too) are far ahead of us in their ideas of the value of horseflesh as food.

With all the wastage which war is causing daily amongst our equine army population it seems an utter waste of good material and of tax-payers' money to allow horses to be sold out of the British Army to feed the soldiers and people of other nations.

As an economic measure they might, at least, be utilised for the German prisoners, and for the Kaffir and Chinese labour battalions. It is well known to the Commanding Officers of all Veterinary Hospitals that those who are employed in horse abattoirs always take away a portion for their own consumption, and the experiment of universally feeding the British soldier on horse meat should certainly have a trial. There is no doubt that wherever it got a fair trial its use would be followed by absolute success and satisfaction. Let it be commenced as an optional or voluntary ration so that all who wish can taste it for themselves. Once the sentimental idea is got over there is no question but that the Army folk will have it, and there is no doubt that wherever it got a fair trial its use would be followed by absolute success.

Original Communications.

THE TREATMENT OF PNEUMONIA BY INTRATRACHEAL INJECTIONS.

BY MAJOR CHAMBERS,
Army Veterinary Corps.

DURING the past nine months excellent opportunities have presented themselves for observing the results obtained from the various methods used in the treatment of pneumonia.

It is difficult to draw a hard-and-fast line between early cases of pneumonia and catarrhal fever; they resemble each other very closely. The majority of cases which we have treated by the newer methods are those which have been received from remount depôts, and which have probably come off a long railway journey the day previously. The length of the journey and the climatic conditions are the determining factors in the severity of the disease. During the ten months that I was Embarkation Officer at a large port in the East this fact was so clearly impressed on my mind that I collected statistics of a large number of shiploads of horses that arrived there after being railed from different parts of England and France to the port of embarkation. The number of deaths from septic pneumonia varied inversely with the duration of the railway journey, and the length of time spent at the port before embarking. Those units that spent five or more days at a rest-camp before embarking had very small casualties, whilst the death rate amongst the horses that were shipped immediately on arrival at the docks was enormous. The disease as met with on board ship is similar to that seen in England. On board ship the disease is undoubtedly infectious, due undoubtedly to the decreased vitality and resistance, combined with the overcrowding that is peculiar and unavoidable on board. Under ordinary conditions I do not think that a case of septic pneumonia

would be of any danger when placed amongst healthy horses. Very few cases of septic pneumonia recover, and if small areas of lung do become septic and a recovery takes place the patient is usually left in such a condition that it is doubtful if it is of any further use to the Army afterwards. These dead areas become encapsuled and the animal may be described as a "lunger." A similar condition exists in cattle after an attack of pleuro-pneumonia contagiosa where a recovery has taken place.

Treatment.—The intrajugular injection of a solution of Formalin was given a good trial in November and December of 1916, but owing to the varying results it was discarded in favour of the intratracheal injection of a 10 per cent. solution of formalin in water. After some weeks it was observed that when hepatisation was well advanced the injection of formalin did not exert any great beneficial action. It was afterwards made a routine procedure to give every animal an injection that was admitted with catarrh or catarrhal fever, for it is these cases that have come off a railway journey that after a few days in hospital develop typical symptoms of pneumonia. After this procedure was adopted the mortality from cases admitted with respiratory trouble decreased to a wonderful extent.

An analysis of the first fifty cases treated by this method works out as follows :—

Disease.			Number treated.		Deaths.
Pneumonia	..	..	3	..	—
Influenza	..	..	2	..	—
Catarrhal Fever	..	..	44	..	1
Strangles	..	..	1	..	—

After treating several hundred cases it was found that in those cases that died after having been treated with formalin a violent inflammation was produced in the mucous membrane of the trachea opposite the site of injection if more than four consecutive doses were given. The solution should be slightly warmed and 10 cc. injected slowly. The needle should be of the trocar type. An ordinary needle gets blocked up by portions of the cartilage of the trachea. One or two injections may be given daily, but it is not advisable to make more than four or five consecutive injections.

In order to attempt to improve on this method creosote was substituted for the formalin and 10 cc. of the following mixture was injected :—Creosote, 1 part ; 63 per cent. alcohol, 10 parts. No inflammation follows the injection of this mixture, and our results show that the use of creosote is to be preferred to formalin.

An analysis of the first fifty cases treated with creosote shows :—

Disease.	Number treated.		Deaths.
Pneumonia	3	..	1
Influenza	1	..	—
Strangles	1	..	—
Catarrhal Fever	44	..	—

Over 400 cases of chest affections have now been treated by both methods, and both appear equally beneficial, but I favour the use of creosote on account of its non-irritability. The amount used is the same as the formalin solution, and four or more consecutive injections may be given without danger.

	No. 7/127.	Age 16.	Influenza.
11-7-17	104° ..	Formalin.	
12-7-17	104° ..	..
13-7-17	103° ..	..
14-7-17	102° ..	..
15-7-17	100° ..	Ammon. Carb	
16-7-17	101° ..	.. ..
17-7-17	100° ..	.. ..
18-7-17	100° ..	..
19-7-17	100° ..	..
20-7-17	101° ..	..
21-7-17	100° ..	..
22-7-17	100° ..	..
23-7-17	99° ..	..
24-7-17	100° ..	..
25-7-17	100° ..	..
26-7-17	100° ..	..

The temperature remained at 100 degs. until August 7th, 1917, on which date the animal was discharged.

	No. 7/327.	Age 14.	Pneumonia.	Remarks.
30-7-17	105° ..	Formalin.		—
31-7-17	103° ..	..		—
1-8-17	101° ..	..		—
2-8-17	102° ..	..		—
3-8-17	101° ..	..		—
4-8-17	100° ..	..		—
5-8-17	101° ..	..		—
6-8-17	100° ..	..		—
7-8-17	100° ..	..		—
8-8-17	100° ..	..		—
9-8-17	100° ..	..		—
25-8-17	— ..	..		Discharged.

No. 7/196. *Catarrhal Fever.*

				Remarks.
16-7-17	103.6°	..	Formalin, 10 c.c.	—
17-7-17	103°	..	„ 5 c.c.	—
18-7-17	105.4°	..	Nuclein.	—
19-7-17	100°	..	„	—
20-7-17	101°	..	—	—
1-8-17	100°	..	—	—
2-8-17	100°	..	—	—
3-8-17	100°	..	—	—
4-8-17	100°	..	—	—
5-8-17	100°	..	—	—
6-8-17	100°	..	—	—
7-8-17	100°	..	—	—
8-8-17	100°	..	—	—
30-8-17	—	..	—	Discharged.

No. 8/277. *Catarrhal Fever.*

				Remarks.
25-8-17	104°	..	10 c.c. Creosote.	—
26-8-17	101.8°	..	„ „	—
27-8-17	102.6°	..	„ „	—
28-8-17	103°	..	Ammon. Carb.	—
29-8-17	101.4°	..	„ „ and quinine.	—
30-8-17	101°	..	—	—
31-8-17	101°	..	—	—
1-9-17	102.2°	..	—	Feeding well.
2-9-17	102.8°	..	Ammon. Carb.	—
3-9-17	101.2°	..	—	—
4-9-17	98.6°	..	—	—
2-10-17	—	..	—	Discharged.

No. 7/330. *Influenza.*

				Remarks.
1-8-17	102°	..	Creosote.	—
2-8-17	104°	..	„	—
3-8-17	101°	..	„	—
4-8-17	102°	..	„	—
5-8-17	103°	..	—	—
6-8-17	104°	..	—	—
7-8-17	102°	..	—	—
8-8-17	101°	..	—	—
9-8-17	103°	..	—	—
10-8-17	102°	..	—	—
11-8-17	101°	..	—	—
12-8-17	103°	..	—	—

				Remarks.
13-8-17	102°	..	—	—
14-8-17	101°	..	—	—
15-8-17	100°	..	—	—
16-8-17	100°	..	—	—
12-9-17	—	..	—	Discharged.
No. 8/49. <i>Pneumonia.</i>				

				Remarks.
3-8-17	105°	..	Creosote.	—
4-8-17	104°	..	„	—
5-8-17	104°	..	—	—
6-8-17	104°	..	Quinine Sulph.	—
7-8-17	103°	..	Ammon. Carb. and Nux Vom.	—
8-8-17	103°	..	—	—
9-8-17	102°	..	—	—
10-8-17	101°	..	—	—
11-8-17	100°	..	—	—
3-9-17	—	..	—	Discharged.

NOTE.—The author cited a list of 40 cases, but owing to the pressure on our space we regret that we are only able to publish six.

POLL EVIL.

BY CAPT. J. A. MATHEWSON,
Army Veterinary Corps.

THE following notes in 29 cases of poll evil admitted to this hospital during the past sixteen months should prove interesting as illustrating the different conditions of the parts met with in this disease. Three cases were due to part of the occipital bone being detached and driven backwards into the tissues of the poll. In these cases the pieces of bone were removed, efficient drainage was secured, and the wounds healed readily in 24, 38, and 59 days respectively. One case was found to be due to a piece of shrapnel lodged in the occipital region. This was 92 days before being issued to remounts.

In two cases resection of the ligamentum nuchæ had been performed previous to admission to this hospital. The sinuses were opened freely and curetted, when recovery took place readily, one in 11 days and the other in 23 days.

In seven cases the ligamentum nuchæ was found to be healthy, but pus had burrowed underneath it. In these cases recovery took place when the abscesses were freely drained laterally. These varied between 21 and 102 days in hospital.

In two cases the abscess was found superficial to the ligament; one of these went to remounts in 10 days and the other in 32 days. In nine cases in which the ligament was found to be diseased, resection

was performed and the whole of the diseased portion removed. These varied from 46 to 85 days under treatment. Out of the 28 cases, 22 have been reissued to remounts, two are still under treatment, and three were destroyed as not being considered of sufficient value to justify treatment.

Seventeen were geldings and ten mares. All were treated by surgical methods as already stated, and this I consider by far the most satisfactory way of dealing with "Poll Evil" in the majority of cases.

A CASE OF TUBERCULAR ARTHRITIS AFFECTING THE CERVICAL VERTEBRÆ OF A MARE.

By LIEUT. W. G. BURNDRED,

Army Veterinary Corps.

The subject of this report, an eight-year old Australian mare, No. 478, was under treatment in the Station Veterinary Hospital, Sehore, Central India, between May 28th and June 30th, 1917, as Case No. 176.

The animal was admitted to hospital on May 28th, 1917, when it suffered from a stiff neck, and was unable to pick up food from the ground level. No history of accident could be obtained, but the following facts were elicited. The animal up to now had shown no signs of malaise, and had gone through the first part of its training—all done in hand—without giving rise to any doubt as to its fitness for military service. When first ridden it appeared to be a little awkward on the rein, and disinclined to raise its neck above the horizontal, but this was not sufficient to excite suspicion of disease.

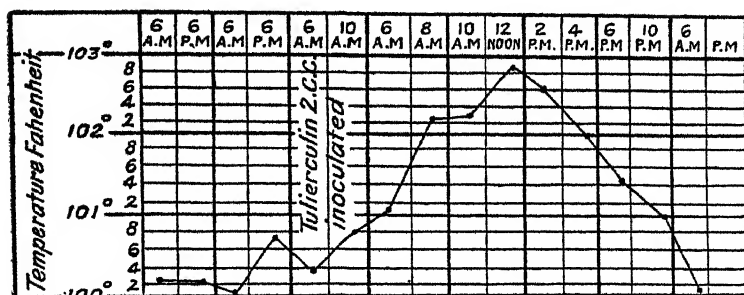
Owing to the pumping apparatus of the station temporarily breaking down the water troughs were not available, and the horses had to be watered at a stream. It was then discovered that this mare could not reach the water to drink, and she was sent to the hospital. Examination revealed impairment of movement in the neck, particularly in the region of the 6th and 7th cervical vertebræ, with pain on pressure or forced movement. There being no history of accident the possibility of tuberculosis suggested itself, and the case was placed in isolation and kept under observation with expectant treatment.

There was no fever at any time during the period of observation, but as the patient did not respond to treatment, tuberculin 2 c.c. was injected on June 26th, when a gradual rise of temperature of 2 deg. F. occurred, with a return to normal within 24 hours.

This might have been considered conclusive, but to reduce the chance of error, the mallein test was applied and proved absolutely negative.

I then definitely diagnosed the case as one of tuberculosis, and the animal was destroyed on June 30th, 1917.

RECORD OF TEMPERATURE: HORSE NO. 478, CASE NO. 176.



The *post mortem* examination was at first disappointing. A very careful examination revealed no lesions of any kind in the heart, lungs, bowels, liver, kidneys, bladder, uterus or brain, nor in any of the lymphatic or other glands. The muscles and joints proved negative until the cervical vertebræ and their articulations were examined. Here the occipito-atloid and atlo-axoid articulation showed no apparent lesion, but the articular surfaces of the axis, 3rd, 4th, 5th and 6th (anterior) cervical vertebræ were found to be studded with small gelatinous nodules of about the size of a pin's head. Those between the 6th and 7th vertebræ were covered over half their surface with similar nodules, but larger in size, up to that of a millet seed, the other halves of these surfaces on either side being adherent and covered by granulations.

This case differs from previous cases I have dealt with, as it *exhibited a tuberculous condition of the articular surfaces as primary lesions*.

There was no osteitis nor periostitis, neither was there any deposit of lime, which I have usually found on the bones in equine cases of tuberculosis.

A CASE OF GOITRE IN A DOG.

By HORACE ROBERTS, F.R.C.V.S.,
Ipswich.

On January 1st this year, a lady brought a fox terrier to me for advice. She said there were two large swellings on the upper part of the neck which caused great difficulty in breathing; incidentally my client reminded me that I had unsuccessfully operated last year for the same disease on the dog's mother, an aged bitch, belonging to our doctor. On examination, I found my patient was a fairly large smooth-coated fox-terrier dog, age 2 years and 3 months; the animal was in good condition, but of a very nervous temperament.

On closer examination, the thyroid gland on both sides was seen to be enlarged to the size of a walnut; the swellings were so extensive

that by pressure on the trachea they interferred with the act of breathing, and the dyspnœa was marked. I found the pulse strong but intermittent, and the cardiac impulse rather violent; the stethoscope revealed considerable hypertrophy of the heart and a regular intermittency at every fifth beat. I could not detect any abnormality about the eyes, nor was there any history of vertigo obtainable.

My client, who had been a nurse, said the swellings had been increasing in size during the previous eight months, and after my examination she said she knew the dog had suffered with a weak heart for about a year. From the experience gained by the treatment of this dog's mother, I was disinclined to repeat the applications of pot. iodide ointment externally, and finally partial removal of the enlarged gland in this case.

I advised the internal administration of thyroid gland and suggested Messrs. Burroughes, Wellcome's "Tabloid," Thyroid Gland, Grain 1, which contains not less than 0.05 per cent. of iodine in organic combination. The dog was given one tabloid every evening for three hundred consecutive evenings, and then brought to me for a second examination on October 30th. On this date I found the thyroid gland to be quite normal, respiration normal, cardiac impulse absent; on stethoscopic examination of the heart, I found a regular intermittency, as I did on January 1st.

I was informed that the dog ran to the surgery, a distance of about one mile, without any respiratory difficulty, whereas on January 1st the animal had to be carried the greater part of the way down and back.

The improvement in the size of the gland and in respiration were noticed after the administration of about one hundred tabloids, that is after a little over three months' treatment.

RHEUMATISM—OR WHAT?

By R. HUDSON, F.R.C.V.S.

Relford.

THE subject was a fox-terrier bitch 4 or 5 years old. She was a great worker, and as such was frequently in the wet. She was very thin in her coat, evidently from sleeping in a warm place.

Her owner informed me that she had become almost useless, because when out with the gun she would suddenly yell out, tuck her tail between her legs, and gallop off home as fast as she could, yelling all the way. I examined her, but found nothing, she being to all appearance fit and well, so I brought her home with me. During the first few days she was allowed to run about the yard and nothing was observed, but later, on being taken out, she showed the symptoms described by her owner.

Examination revealed nothing to account for the peculiar symptoms; legs and back were freely manipulated without evincing any sign of pain. A purgative was given, but without benefit. Puzzling over her, it occurred to me to try soda salicylate, on the chance that the pain might be muscular. After a few 10-grain doses the symptoms ceased, and although some months have elapsed they have not returned.

NECROTIC VAGINITIS IN CATTLE.

By G. MAYALL, M.R.C.V.S.,

Case I.—Cross-bred shorthorn cow, 5 years old, recently calved; part of the cleansing retained; os uteri almost closed; straining badly. Thickened greyish-coloured membrane on the floor of the vagina, not extending far in, but involving the urethral opening. Passed the catheter and drew off dark-coloured, bad-smelling urine. Injected the vagina with dilute creolin solution and powdered the membrane as far as reachable with oleate of zinc, after swabbing the diseased mucosa with fresh creolin solution. Gave the cow a draught of hyposulphite of soda 1 ounce, pot. nit. 1 ounce, and water to a pint. On visiting the cow next day found her no better, straining frequently and voiding dirty, sanious, bad-smelling fluid. Injected the vagina and swabbed it out with mercuric iodide solution, drew off the urine, and smeared the diseased surface with iodoform ointment, and left a box of the ointment for the cowman to dress the vagina daily. Briefly, this cow lived five days and then died.

Case II.—Red and white horned cow about 4 years old, recently bought from Ireland and only in my client's keeping two days. Thickened brownish-grey deposit at the entrance of the vagina, extending about 4 inches on its floor. Parts of the cleansing still retained. Cow straining, but able to make water. Injected the vagina and swabbed it out with mercuric iodide solution and inserted a salol pessary. Internally, gave a dose of hyposulph, soda and pot. nit. Left a bottle of mercuric iodide solution to be used as an injection daily. Cow lived a week and then died.

Case III.—A black-and-white horned cow recently bought; three days with present owner. Part of cleansing removed and vagina injected and swabbed out with mercuric iodide solution and mercuric chloride bougie inserted. Mercuric iodide solution and 3 mercuric chloride bougies left. Cow able to make water. Internal antiseptics given in linseed tea. On visiting next day, cow brighter and eating better.

The above daily treatment was continued for ten days and the cow recovered.

Remarks.—There seems to be an intimate connection between

this complaint and retention of the afterbirth. In two of the cases a piece of necrotic cleansing was situated directly over the diseased vaginal surface. Many of the dairy farmers in this district believe that the seller of the cow cuts off the cleansing short with scissors or other instrument and that the complaint arises from the cut end lying in the vagina. In the cases I have been to I have never observed any part of the cleansing outside the vagina.

I believe this malady is a necrotic one.

Herzog, in "Disease-Producing Micro-Organisms," attributes it to the bacillus necrophorus veranus A. Moore believes it is due to the bacillus of necrosis.

Buchanan considers the organism causes ulcerative and necrotic vulvitis and vaginitis, and describes the local lesion as a "sharply circumscribed patch of yellowish-brown, dry, crumbly tissue *débris* of soft cheesy-consistence." It has been suggested that the organism produces a true toxin, because of its intense local destruction of tissue.

H. J. Gobert, the French veterinarian, says: "The cause is an infectious agent as yet unknown." He states that Leclerc recommends injections and tampons of perchloride of iron twice a day at first, and subsequently at regular intervals. In the cases we have seen, we have not found the whole of the vagina and uterus infected, the disease appearing to be localised.

SUBCUTANEOUS EMPHYSEMA.

By R HUDSON, F.R.C.V.S.,

Retford.

APART from subcutaneous emphysema, due to air being sucked in through wounds of the skin by movement, escape of gas when puncturing the rumen, lesions of lung tissue and black quarter, there sometimes occurs in cattle a more or less general emphysema, the origin of which is not quite clear.

Case I.—A cow which generally milked herself poor. She was in low condition, had been calved five days, was coughing, cold about her extremities, feeding badly, retaining placenta, and had a temperature 104F. When taking her temperature my hand came in contact with emphysema over the gluteal muscles, and on examining further I found well-marked emphysema over the gluteal region, along each side of the spine, intercostal spaces, and behind the shoulders. In this case it may be that the gas was generated by some bacillus, which, finding its way from the womb by the blood stream, settles in the subcutaneous tissue. One sometimes finds the foetal membranes, when in a septic condition, infiltrated with gas, which doubtless has been generated by organisms contained in it.

Case II.—A fat shorthorn cow recently calved. Calving had been normal, and she had "cleansed" all right to all appearance. She was not feeding well, and as I was on the farm, my attention was called to her. As in the first case, while taking her temperature my hand came in contact with a crepitating swelling over the hind quarters, and examination discovered it along the loins and withers. No septic discharge was noticed, though it is possible some changes had taken place in the contents of the womb, for her temperature was high.

In cases I have seen, the condition does not appear to be serious, and recovery has taken place. The animals have been warmly rugged and fed on scalded food. Pot. Nit. and Soda bicarb. have been administered, followed by Ammon. carb. and Nux. Vomica as the temperature has fallen.

RAMBLING REMINISCENCES OF A REMOUNT OFFICER IN THE U.S.A.

BY CAPT. E. C. WINTER, F.R.C.V.S.,
Army Veterinary Corps.

HAVING come to the conclusion that it was "up to me to do my bit" in the great struggle for world freedom, I set sail in September, 1914, under orders from the D.G., A.V.C., for Canada. I was pleased to find among my fellow passengers several old friends and acquaintances, amongst others, my colleague P. D. Reavy, from Ould Donegal; Ernest Bellany, of Lucan, county Dublin; Major Robertson Aikman, and several others. We remount men made quite a pleasant party on the way out. We were all sorry to leave the ship, and on arriving in port we got orders to repair at once to report at headquarters, so after a hurried look at the big city we set out that night, and made our first trip in a Pullman. I do not like them so well as our own sleeping cars. There is no privacy, and the arrangements for washing and dressing leave much to be desired; however, one soon learns to get dressed lying down, as well as not to step on the face of the lady below, if one has got an "upper," when getting out. Personally I prefer the "upper," one gets six inches more length, and more fresh air. The coons in charge of the trains keep them too warm, and don't know what proper ventilation is. In fact, all houses in America are kept too warm for comfort or health.

On arrival at the city of our destination we hid ourselves to headquarters and made the acquaintance of our then chief, the late Sir Frederick Benson, whose loss we all regretted, and on whom every member of the staff looked as a personal friend. After a few "pow wows" with the P.V., we were all assigned to our stations.

I soon got initiated into the ways of the Commission, but I never

ceased to wonder at the supply of light draft horses, eminently suitable for artillery work, that seemed to have no end, and now, after nearly three years, and a drain of over a million, the supply seems as inexhaustible as ever. I do not think much of the American cavalry horse, and, even at that, the supply here is limited. Motors have done a lot to knock out the light horse here, and the suppression of racing in several states has done the rest. I regret very much to read that racing has been suppressed in the old country for the present. If it were not for racing—and, still more, for hunting—the War Office could whistle for cavalry horses. For the future, as in the past, Ireland must be the "happy hunting ground" for such horses, and the Government should look to it before it is too late. The horse-breeding industry took centuries to build up, and the Government won't take long to knock it out if they persist in ignoring the breeder.

I hope this is not treason; any way it is gospel truth. The light cavalry, well-bred horse does not pay now to produce at the trooper price, and the industry must be fostered if it is to be kept up. Where will we get those incomparable thoroughbred sires from, in the future, if racing is not kept up; and where will we get, in a hurry, as we had to get them in the Autumn of 1914, such a supply of troopers and chargers as was then available, if hunting is not fostered? Where, also, can our cavalry officers get the training they get in the hunting field? The wearers of the scarlet hunting coat have given a good account of themselves in the field of battle.

Missouri is also famous for its mules, and those mules were a revelation to some of us. A Britisher does not know what a good mule is, or the amount of work he can do, or the small quantity of food, or the poor quality of it, that he can live and thrive on. Those mules, as a rule, are patient, good-tempered animals, but one sometimes meets with a "mean" one that brings back recollections of Mark Twain. This is often forcibly brought to one's mind on shipping a load of those long-eared brutes (without pride of ancestry, or hope of posterity), when one of them makes up his mind not to go into the car and hangs up the shipment for a while. They say here that it takes a nigger to manage a mule, and there is some truth in the statement. I was often amused to hear the coons talking to their teams on the streets and on construction work. At the latter job the mule seems to be indispensable, hauling loads up a steep grade such as one would not think of asking them to haul at home. The American mule grows to a good size, running as high as seventeen hands, and built heavily and stockily—a good many that I saw would weigh close on a ton.

Those mules command a good price and are more valuable than

horses. A good mule is worth more than a horse any day in this country, and the farmers are turning their attention more to the breeding of them.

For about six months I stayed on in this city, where two horse buyers and one mule buyer were kept busy "day in, day out." At the principal depot in the States there is an enormous collection of farms, where nearly all our mules and horses are sent to get over their "shipping fever" and to await shipment to the coast. About 50 per cent. of the horses bought get sick, and if they are shipped "unsalted" the losses are great. This proceeding has turned this depot into a huge hospital, or rather several huge hospitals, necessitating a big veterinary staff, and the work of that staff is no sinecure, either. A small army of men is employed at this depot alone, and the conveniences for doing work are not lacking.

The Missouri mud can stick "some," and gets pretty deep after rain, and the dust in the summer-time is almost as bad. The stock here are, of course, fed and kept on the "corral system," and the quantities of food consumed are enormous.

An ordinary train-load consists of about 600 head, about eighteen artillery horses or twenty mules being comfortably carried in a 36-foot car, and twenty of the former or twenty-two of the latter in a 40-foot one.

The Commission buys four "grades" of horses and four of mules, but by far the greater portion of the purchases have been artillery horses and mules. The horses run from cobs of 14.2 to 15 hands to cavalry of 15 to 15.3; artillery, 15.2 to 16 hands; and heavy artillery over that height, and heavier than the ordinary gunner. The supply of draft horses is a never-ceasing wonder to us Easterners, and the quality is the best. They have blood, action, and bone, and most of them are really good movers, and nice clean-legged horses. The hairy-legged animal is to be avoided, and so is the black Percheron; neither of them stand hard work or travelling, and are liable to visit the "sick lines" too often to be of real value in a campaign.

I went from this city to another large buying centre in April, and bought there till the "Fall." The class of horse put up to us in my second location was not so good as those I saw at first, a good many of them being "range horses" and not properly broken, as well as not having the quality of the horses in the "Middle West." From here I was sent to a third large purchasing centre, where the stuff was very good. The bigger dealers always bought carefully, and had very few rejects. The men who bought "anything," under the impression that it was "good enough to be killed," burned their fingers badly, and soon found out that the best was none too good. I think, speaking

from recollection alone, that about 20 per cent. of the horses and mules shown by the better dealers failed to pass the first inspection. A few of those joined up later, when they got into better condition, and got over a few temporary disabilities, such as lameness or colds.

It is remarkable how few roarers were sent up. Roaring cannot be so prevalent here as in the old country, possibly due to the dryness of the climate and the fact that all young horses, and a good many of the old ones, run out a good deal. A good many go roarers after they get strangles and pneumonia, both which diseases are very rife wherever a number of horses are congregated.

We got some very fine horses here, and a good many nice cavalry horses, too, most of those coming from Kentucky way, or being bred off sires from that State. A good many of the artillery horses picked up there would make useful heavy-weight hunters, and it seemed suicidal on the farmers' part to sell a good many of the brood mares, a large percentage of which turned out to be in foal. When done with in France those mares should prove very useful in building up our own stock again. If the American (average) farmer, like his brother in Great Britain, would only pay a little more attention to the sire he patronises, he would make a good bit more money of his young stock. Most of the crosses they try are too violent, and they get a nondescript steed that is good for nothing. The Government here should take up this question, too.

In the Fall of 1915 I went to depot work at one of the ports where we keep a stock on hand for shipment. It was my first experience of "wholesale doctoring," and I learned and unlearned a good deal. We nearly always had about 2,000 head of stock there, and you may imagine we had quite a few sick ones amongst them. The hospital had always about 250 inmates, most of them strangles or pneumonia cases or catarrh, which is, I think now, often only another form of strangles. We had, of course, the usual number of accidents, but, considering the numbers handled, accidents were rare enough. We always tried to have the stock a couple of weeks at the port before shipping, so as to be sure they got over the effects of the rail journey; they were generally from five to six days on rail, with a couple of stops for feeding, rest, and water. A shipping day was always a busy time. We gradually got 600 or 700 on board in two or three hours. All horses were shipped with fore shoes, and this was done at the port, they doing the rail journey bare-footed. The mules are shipped unshod all the way. Mules are shipped across in pens of three or four, horses are all tied up with their heads to the alleyways.

The losses at sea are really very small, considering that unfit horses have sometimes to be shipped, when a steamer has to be loaded

in a hurry. In fact, the percentage of losses from all sources is very small, even counting in two or three boatloads lost *in toto*. Sometimes, on rail, or in the stockyards where the horses and mules stop over to feed, one gets a broken leg, or a very badly strained back, but, all things considered, accidents are rare.

As I said before, the supply of cavalry horses in the States is limited, and a fast decreasing quantity, and Uncle Sam may yet be hard set for them himself. It is "up to him" now, as it is to our own Government, to see that the supply is not allowed to run out. The cavalry horse does not pay to raise at the price either Government pays for him, and motor traction is a strong factor to be reckoned with. "Henry Ford" has done more to oust the light horse than anyone else has. We need a Napoleon of some sort to keep what we have and to provide for future needs. The U.S.A., as a whole, does not lend itself to hunting, and most of the inhabitants are too busy "dollar hunting" to worry about it. We must look to Ireland for our future riding horses, where the soil, the pasture lands, and the temperament and tastes of the inhabitants all lend themselves to the production of a high-class, well bred-horse, with a good constitution and plenty of pluck. We must above all things try to retain our good brood mares. Any breeder with a good mare can, and will, find a good sire; it is the breeder with an indifferent mare that goes to the nearest horse, or to "So and So's" horse, simply for love of the owner, or as a matter of convenience and geography, in all countries.

While "talking horse" I must not forget to mention other things that struck me in this big half-developed, or rather "not half-developed" country. The first thing that strikes the Easterner is the size of the continent. We at home have very little idea of what a thousand miles means; one must travel a few thousands to get that idea, and see the miles on miles of prairie lands, yet untouched, and a good deal of it very fertile, and a good deal more capable of being made so at very little cost. The trouble with most American farmers is that they have too much land on hand and cannot properly look after it. The consequence of this is that waste of all sorts goes on, and the land is rapidly run out, when a little proper cultivation would restore it to its pristine fertility. I believe there is more foodstuff and farm produce wasted in the States than would keep the population. There is a great complaint of want of railroad facilities in a good many places, and also of a scarcity of labour. With the advent of motor traction, which has come to stay, and of all sorts of labour-saving machinery, this complaint is more fancied than real, the fact being that the farmer, like a lot of his brethren in the old country (and particularly in my old country, "the most distressful country that ever yet was

seen," and, withal, the pleasantest one to live in), is unthrifty and wasteful.

On the good, deep soils of the Middle Western States one good crop in three years will clear the farmer's expenses and leave him a margin besides. Another thing that tends to losses amongst the farming community is that they often put all their eggs in one basket and don't go in enough for mixed farming, [some farmers buying milk and butter and vegetables for their own tables instead of "raising" them. I thought the Irish dairy farmers and the French peasant proprietors were lazy and untidy, but I'll "hand it" to the American. He out-herods Herod.

There are some spots in the wildernesses through the country well worth seeing, and even a busy remount officer could take an odd week-end off and see them. The depot worker has no chance at all. I was able to take a few week-end trips up the far-famed Rockies. The trip up the Big Thompson Canyon, to Estes Park, is one of the finest in the world, and one feels one's-self a very small thing indeed in those mountain fastnesses. The road is a dangerous one, and a motor driver wants to be a strict teetotaler here, if not everywhere in the world. The road has been blasted out of the solid rock nearly all the way for about 50 miles, and runs along the edge of a rushing stream, sometimes a couple of hundred feet below, curving round corners and hanging to the face of the cliffs in some places, and in others dipping down at an alarming rate with just one track, and a foot or two of slippery earth on the outside. Passing-places have been made here and there for cars to get by, and sometimes, after heavy rains, the track on the outside edge slips away under the weight of the car; this means "good night" to the occupants. I happened to meet a farming outfit on this road at one point, and passing was out of the question for about a dozen miles. The farmer did not "worry," he let us do that. Anyhow, we had to do our last 10 miles in the dark, but fortunately our driver knew every inch of the road. Another fine trip leads to "the Top of the World," Mount Corona, a land of perpetual snow. On 12 miles of this road there are twenty-eight tunnels, and the grade is very steep all the way, so steep that the trains actually take as long to come down as to go up, it being a case of brakes "hard on" all the way. The mountain scenery here is superb, and the line a marvel of engineering skill. Some of the trestles don't look like being equal to the job they are asked to do, but it is cheaper to pay a few dollars compensation, if there is an accident, than to build up the track properly, and then maybe have an avalanche or landslide sweep it all away. I was able to get a good picture of the engine of our train from the observation car going round

a curve. It makes one dizzy to look over the edge, and down where the line showed, thousands of feet below, how far we had climbed up, and yet how short a distance, straight down, our starting point looked from us. I went up in August, when it was "some hot" and we could pelt snowballs *ad lib.*, and pity the poor fellows sweltering in the city.

The Rockies, as the name implies, are bare and "rocky" all the way through, with very little signs of life, either plant or animal, and are very sparsely timbered; their vastness is their principal claim to distinction, and the grandeur of some of the canyons and precipices is something to be remembered. I have been across them in three different places, and every time there was something new to be seen, but above all things was a feeling of desolation and loneliness that I never could feel in the mountains of the East, such as The Alleghanies. The latter are well-wooded for the most part, and look entirely different from the Rockies, being clothed with timber or verdure of some sort, and inhabited by birds and beasts of all kinds.

Colorado Springs, near Denver, is a beautiful spot and well worth a visit. "Look-out Mountain," about 10 miles from Denver, is also worth seeing, and is now famous as the resting-place of the famous "Buffalo Bill." Glenwood Springs, Colorado, is also a lovely place, and a famous health resort. Colorado is the happy hunting-ground of "lungers" from all over the States, the dry, rarefied air being an inveterate enemy of the *bacillus tuberculosis*. Pikes Peak, close to Colorado Springs, is one of the landmarks in the Rockies round here, and it is considered "the thing" to climb it. One does not want to be "short-winded" for the job, and I left it for the younger and more adventurous of our party. Most of the climbers give in half-way up, as the difficulty in breathing "gets their goat." Even in Denver itself, until one gets acclimatised, breathing is difficult and exertion not pleasant by any means. The foot-hills round the city would be mountains anywhere else, and this part of the State all lies high.

Entirely different are the flat alluvial lands of Oklahoma. Here the soil is often 15 and 20 feet deep, and apparently inexhaustible. Some of the farmers take this view, anyhow, and raise crop after crop without any pretence at manuring or even sub-soiling the land. This is a new State, and not long settled, in fact a good deal of the land is not yet taken up at all, and might not be a bad investment, as oil is being struck all over the place. Just now (June, 1917), they are having a series of tornadoes all over the Middle West, and oil derricks, farmsteads, and whole towns are being swept away, and floods are doing their part in the general devastation. The people seem to take these things as a matter of course, and just turn round and rebuild as soon as the trouble has blown over.

While I was stationed at one city in the fall of 1916, we had a bad flood. In one night the little river rose about fifty feet and made a sea of about ten square miles of the country, and invaded the town, too. So rapidly did the waters rise that four trains got stalled in the depot, the passengers thinking the whole thing a joke till the floors of the cars got flooded a foot deep. All were safely taken off at last in the only boat available, and there was "some" crowd in the local hotels for a few days. Only one route out of eight, to and from the town, remained open. Although there were some narrow escapes, and some awkward predicaments, no lives were lost. Four railroad men just got time to climb a post about two miles from the town, and had to remain on their perch for twelve hours, till the flood went down. The barn where we bought was under four feet of water, but the owner, "wise" to what might happen, had got up in the middle of the night and taken all his stock to higher ground. Those little things are looked on as a nine days' wonder in this "land of the brave and home of the free."

Virginia is a historic State, and shows traces of the great Civil War in every corner. Newport News itself is not much of a place, but is now rather important as a shipping port for horses and mules, and also a coaling station for steamers, the great Virginia and West Virginia mines having an almost inexhaustible supply of that very necessary article in peace times, and much more necessary now that the world is at war. The coaling is a revelation in itself, to anyone who has not seen the process, whole car loads (about fifty tons) being handled at once by powerful electric machinery; the cars are lifted to a high platform, put on a special truck, run down to the landing stage and inverted bodily into shoots running to the holds of the vessels. There are several of those coaling stations along the coast round Norfolk, and they are all kept busy. I have seen hundreds and hundreds of car loads "side tracked" round Newport News and all over the country, waiting for shipment, or, often, for a rise in prices. This would account for the supposed, or actual, shortage of cars so much talked about lately.

Grain is sometimes held in the same way. The grain elevators all down the coast handle their stocks in somewhat the same way that the coal stocks are handled, only that the grain is pumped, or blown, through tubes to its destination in the holds of the boats, the cars being emptied in the same way into the elevators. Old Point Comfort, between Newport News and Norfolk, on the mouth of the Potomac river, is a much-sought-after summer resort, and, indeed, the "Chamberlain Hotel," one of the best in this land of good hotels (one must hand it to the American hotels), is always full, winter and summer.

It is not by any means a poor man's hotel, though ; but " we should worry," the American on a holiday does not stop to count the cost, and the accommodation is superb. There are trips all round Chesapeake Bay, and up the Potomac to Washington, and by sea to New York every day, that are well worth doing if one had the leisure and the cash. The trip to New York, once the Capes (Cape Charles and Cape Henry) are passed, is not very interesting, the coast line being flat and sandy, and only occasional glimpses are caught of the pleasure resorts on shore, the water being too shoal to allow of a close view.

New York Harbour is worth seeing, with its famous Statue of Liberty and its never-ceasing stream of traffic. The city itself is almost as well-known to Britishers as London is, and I will leave the task of describing its wonders to the guide books and illustrated papers.

Washington, D.C., is one of the most beautiful cities I have ever seen, rivalling Paris, Berlin, or Vienna, but in a different way. The city is well laid out, and the principal avenues radiate from a common centre, and are well planted and well kept. The Capitol and other public buildings have been so often described, by abler hands than mine, that I will pass them over, too. Most of the modern cities in this country of modern things are well laid out, and all of them have plenty of room for expansion, in the West, anyhow. Of course things are a bit congested in some districts of New York and Chicago and a few other modern Babylons.

Some of the old " Southern Homes " in Virginia are very beautiful, but they are fast giving way to modern, and often hideous, " improvements," and are no longer kept up like they were before the Civil War. There will be some changes in the Old Countries after this war, too.

Public opinion has undergone a wonderful change in the States in the last few months. At first people thought that they had no " finger in the pie " here at all, now they realise that the Allies have been fighting their battle all those long and weary months, and that " it is up to the States now to do their bit." They mean to do it, too, I think. They never do things by halves here, and when they do tackle a job, " by Heck, sir," they take their coats off to it and allow nothing to stand in their way.

It is surprising what a difference a " stop over " and food and water makes to a shipment of horses, if there is someone to look after them and see that they get it. Animals that look sick and tired and gaunt on coming in, load out like two-year-olds after their rest. It is also important to have the sick ones " cut out " in transit ; another twelve hours' rail may mean a dead horse or two, where they can

easily be saved by a little nursing. On a wholesale job, like this is, one loses one's faith a good deal in drugs, and learns the value of nursing, fresh air and water. This would, I know, be rank heresy in private practice. Here, also, one sees the sort of horse that stands knocking about and the sort that should be avoided. The black, and, to a lesser extent, the grey Percheron, and all hairy-legged horses make bad travellers, and consequently bad workers and bad grubbers. The well-bred little horse that always has his nose in the manger and sports a good cupboard to put the grain into can make rings round some of the others that look so good on the floor when being shown, and go back every day when asked to travel or do any work; and when they get sick, hang their heads and refuse to take any interest in life.

I could, of course, say a lot more (some of your readers will probably say "Thank God he didn't"), but I hope, some time in the future, to exchange experiences and to hear how they do things "Somewhere in France."

In the meantime we must persevere to the end, and finish the job we have put our hands to.

THE SOMME VETERINARY MEDICAL ASSOCIATION.

A SUGGESTION was started that a Veterinary Medical Association at a centre "somewhere in France" would be likely to be beneficial to those veterinary officers who were stationed in the neighbourhood, and the outcome of it was that the following officers met together on October 29th:—Colonel Newsome, C.M.G., D.D.V.S., Majors Learning, D.S.O., Hobday, Porteous and MacArthur, Captains Burton, Ferguson, Player, Marks, MacMahon, Braund, Watson and Finch, Lieutenants Mettam and Blaye. Before the meeting two interesting hospital cases were shown by Major Hobday, one a case of "arrested development" in a seven-year-old horse, and the other a case of paralysis of the flexor metatarsi muscle.

After an address by Colonel Newsome, explaining the objects and mutual benefits accruing from such an association, it was decided that meetings be held each week (or each fortnight, as circumstances permitted) on Mondays at 5.30; and it was unanimously agreed that the Society be called the "Somme Veterinary Medical Association." Colonel Newsome, C.M.G., was unanimously elected President, the vice-Presidents being Colonel Kendal, Major Learning, D.S.O., and Major Hobday. Lieutenant Mettam was appointed Secretary.

As qualifications for membership it was decided that all must be duly qualified Veterinary officers in the Army Veterinary Corps; and as visiting members it was decided to admit all Veterinary officers

of the Allied Forces, all lay officers attached to the Directorate or the Veterinary Service of the Army Veterinary Corps.

In regard to subjects for discussion, it was unanimously agreed that "subject headings" were preferable to actual papers, and a number of titles were suggested for consideration; such, for example, as:—

1. The Organisation of the Army Veterinary Corps—(a) At the Front; (b) Mobile Sections; (c) In the Hospitals.
2. The Pros and Cons of Clipping.
3. Certain diseases such as Glanders, Cellulitis, Epizootic Lymphangitis, Stomatitis, Mange, Ringworm, and others.
4. Mallein: Its Uses, Vagaries, etc.

The first subject was selected for the next meeting, to be held on November 5th, and Colonel Newsome promised to address the members upon it.

Review.

THE CAMEL AND ITS DISEASES. By H. E. Cross, M.R.C.V.S., D.V.H., A.Sc. Pp. 151. 48 illustrations. 5s. nett. Published by Baillière, Tindall & Cox, London.

It is not often that two works on such a special subject as the diseases of the camel appear at the same moment, and veterinary service has, up to the present, had a dearth of literature upon the subject. The publication, however, of each of them has come at an opportune moment, for both authors are known as specialists on the subject, and thousands of camels are now being made use of during the war. The "Tips on Camels," by Capt. Leese, has already appeared as a serial article running through the *VETERINARY JOURNAL*, being published as a brochure afterwards; and the present work by Mr. Cross is a most useful little volume of some 150 pages—fully illustrated—excellently bound and got up—full of information of the utmost value to veterinary officers where camel corps and camel hospitals exist, and full, too, of practical hints to the purchasers, owners, and breeders of these unwieldy beasts.

Commencing with chapters on purchasing, loading, feeding, and breeding, the author describes by texts and illustrative photographs the methods of restraint and the various species of camel in use for riding or for pack purposes. A chapter is devoted to fractures, dislocations, malformations, wounds, and lameness. Diseases of the mouth, throat and head form another chapter. Skin and microbial diseases are discussed, and the whole of the alimentary and respiratory systems are gone through in detail and fully described.

A most useful chapter is devoted to anæsthesia, castration, and the commoner sources of poisoning. Names of diseases and fodder are given in the vernacular, and the whole book teems with useful hints and useful matter. Certainly no veterinary surgeon going East should be without it, and as it is small in size it should find a place in every veterinary officer's kit-bag,

Personal.

MAJOR-GENERAL SIR ROBERT PRINGLE, K.C.M.G., C.B., D.S.O., whose retirement from the position of Director of Veterinary Services has been gazetted, has been in ill-health for some time. Graduating at the Glasgow College in 1874, his career in the Army Veterinary Corps commenced in 1878, and his war service included the Afghan, two Indian, and the South African campaigns—in addition to the present war. For services in the Boer War he was mentioned in despatches and received the D.S.O. During the present war he was made a C.B., and in January last received the honour of K.C.M.G. Sir Robert carries with him the good wishes of his colleagues that he may recuperate in health on his retirement, and live for many years to enjoy the rest to which he is entitled. His photograph recently appeared in the VETERINARY JOURNAL for March, 1917.

CAPTAIN J. E. HANNA, A.V.C., has been awarded the Military Cross. Captain Hanna is a Canadian, a graduate of the Toronto College, and is the first Canadian Veterinary Officer to receive this honour.

FOURTEEN of our French colleagues have recently received distinguished recognition for services rendered: Veterinary Majors Chantrelle, Séquin, Ducher, Deborne, and Druille being awarded the grade of Officer of the Legion of Honour; and Veterinary Majors Lavaux, Sorriaux, Mourer, Lostie, Bonhomme, Béry, Allain, and Canos being awarded the title of "Chevalier." For distinguished civil administration M. Rousseau, Municipal Veterinary Surgeon for the City of Reims (Marne) has been mentioned on the list of citizens who particularly distinguished themselves since the outbreak of hostilities. The congratulations of the members of the profession in Great Britain are given to our distinguished colleagues.

THE ARMY VETERINARY CORPS has sustained a great loss in the death of Lt.-Col. F. V. Carr, whose work in Egypt and the Soudan did so much for the Egyptian cattle trade. In fact, it has been said that no man ever did more towards establishing this on a satisfactory footing. As a soldier he had seen a great deal of active service, having been with the Tirah Expeditionary Force in 1897-98, in the South African War (in which he was severely wounded in 1901), and in 1906 in the operations in Northern Nigeria. Genial in manner, with a true pride in his Corps and the profession he had taken up, Colonel Carr was one of the most popular and capable men in the Service, and his loss is one which cannot readily be replaced.

A QUITE recent communication from Dr. Campbell, editor of the *American Journal of Veterinary Medicine*, states that "more than 800 veterinarians have already been assigned to duty in the American Army and are now at the various remount stations. Nearly as many more have been examined and are expecting orders to report for duty daily. The Order authorising the organisation of the Veterinary Corps has been signed by the Secretary of War, and provides for 53 majors, 200 captains, and 1,500 first and second lieutenants. It is understood that three colonels also will be appointed, but there has been no official announcement as to this yet."

Obituary.

PROFESSOR A. E. METTAM.

PROFESSOR A. E. METTAM, B.Sc., M.R.C.V.S., Principal of the Royal Veterinary College of Ireland, was born at Retford, Notts., fifty-two years ago, and was educated at Retford Grammar School. He was then sent as a pupil to Mr. G. S. Talbot, M.R.C.V.S.; with whom he spent some time. He resumed his professional education at the Royal (Dick) Veterinary College, Edinburgh, where he had a most brilliant college career. He qualified in 1889, and the same year gained the Fitzwygram first prize, a record which has just been emulated by his eldest son. After he left College he spent a few months in practice with Mr. Stanley, of Birmingham. He then returned to the Dick College as a member of the staff, and when Sir John McFadyean left for London he was appointed to the chair of Veterinary Anatomy and Histology, and he afterwards, during the illness of Professor Walley, acted for a time as Principal at that school. He graduated in Science at Edinburgh University in 1895, and was appointed George Heriot Research Fellow of the University in 1896. The Steel Memorial Prize was presented to him by the Council of the Royal College of Veterinary Surgeons on account of the merit of his scientific researches. At the inception of the Royal Veterinary College of Ireland under a Board of Governors, he was selected as Principal in June, 1900. Under his guidance and direction the College was built and developed, and it was due to his energy and ability that the school has attained its high reputation and has proved so highly successful. The development of this important institution will always be associated with the name of Professor Mettam. In recent years the school was taken over by the Department of Agriculture and Technical Instruction for Ireland, and its future assured. Professor Mettam held the Chair of Pathology and Bacteriology and in this domain has gained a world-wide reputation. He devoted

himself with his well-known enthusiasm and learning to research work in connection with the diseases of live stock. He was Editor of the *Veterinarian* 1895-1900, and was a frequent contributor to professional journals. Unfortunately, many of the fruits of his researches remain unrecorded. He was a fine microscopist, in which work he had few equals. He has filled the appointments of Examiner in the National University of Ireland, and in the Universities of London and Manchester. He was a Member of Council of the Royal College of Veterinary Surgeons since 1901, was Vice-President in 1903, 1904, 1907, 1910, and 1913, and was elected President for two successive years, 1911 and 1912. During his Presidency the annual meeting of the R.C.V.S. was held for the first time in Ireland. He was a member of many societies and learned bodies, in which he took an active interest. He was a member of the Council of the Royal Zoological Society of Ireland, and the Royal Irish Academy, and a past President of the Scottish Microscopical Society. He was during several years President of the Veterinary Medical Association of Ireland. He took a prominent part in the campaign instituted by Lady Aberdeen in connection with tuberculosis, was a member of the Milk Commission appointed in 1913, of the Cancer Research Committee and the Committee appointed to investigate Foot and Mouth Disease. He was a man of wide knowledge and deep erudition, a great personality, an eloquent speaker, enthusiastic for his work, his profession, and the college of which he was principal, always available for advice and help to his friends and colleagues. He took a great interest in the welfare of the students, not only in their work, but in their pastimes. Through his instrumentality a Veterinary Contingent of Officers Training Corps was instituted; of which he became the Commanding Officer, with the provisional rank of Major (T.F.).

He was in harness up to about a fortnight before his death. He passed away at his residence, 126, Pembroke Road, Dublin, on the 27th of November last. His loss will be deplored by his friends and by the members of the profession.

He leaves behind him a widow, a daughter, and three sons. His eldest son is an officer in the A.V.C., and his second son holds a commission in the K.O.S.B.

The funeral took place on the morning of Friday, November 30th. A service was held in Bartholomew's Church, Clyde Road, at 9.15 a.m. The Rev. Canon White officiated at the service in the Church, and at the graveside in Deans Grange Cemetery. The following attended the funeral:—R. W. M. Mettam, Lieut., A.V.C., A. S. F. C. Mettam, sons of Professor Mettam, and T. Morison, brother-in-law, as chief mourners; Rt. Hon. Sir T. W. Russell, Bart., M.P., Vice-President, D.A.T.I., T. P. Gill, Secretary, D.A.T.I., Professor J. R. Campbell, B.Sc., Mr. Herbert G. Smith, M.A., LL.D., Mr. J. V. Coyle,

Mr. Wm. Bowers, Mr. M. Deegan, representing the Department of Agriculture and Technical Instruction for Ireland; Professor J. F. Craig, M.A., Professor O'Connor, Professor Browne, Professor Dunne, Dr. S. Johnston, and Mr. Haines, Registrar, representing the Royal Veterinary College of Ireland; Mr. D. S. Prentice, chief inspector, Mr. W. P. Cushnahan, and Mr. Finlay Kerr, representing the Veterinary Branch, D.A.T.I.; Mr. J. H. Norris, Mr. J. B. Dunlop, and Mr. L. M. Magee, representing the Veterinary Medical Association of Ireland; Mr. A. Watson, representing the Veterinary Department of the Dublin Corporation; Mr. P. A. Dowling, B.A., and Professor G. Carpenter, and Professor T. Johnston, representing the Royal College of Science; Col. E. C. Rutherford, C.B., C.M.G., D.D.V.S., and Capt. Reavy, A.V.C., representing the Army Veterinary Corps; Mr. J. Ewing Johnston, representing the North of Ireland Veterinary Association; Mr. F. W. Garnett, President, R.C.V.S., Fred Bullock, Secretary, R.C.V.S., Sir John McFadyean, LL.D., Mr. P. J. Howard, and Mr. Finlay Kerr, representing the Royal College of Veterinary Surgeons; Mr. W. Cargill Patrick, representing the Central Veterinary Medical Association of Ireland; Professor R. McAllister, LL.D., representing the Royal Irish Academy; The President of the Royal Zoological Society; Dr. Coffey, President, and Sir Joseph M'Grath, Registrar, University College, representing the National University; The Archdeacon of Dublin, Rev. J. L. S. Smylie, Dr. G. H. Pethybridge, Professor J. Wilson, R. H. Lambert, Mrs. Kehoe, Sir William Thompson, Registrar-General, Dr. S. T. Gordon, R. W. Robinson, C. Jones, G. W. Tyson, W. Ashe King, Rev. J. L. J. Smylie, Henry Gibson, Jas. McKenny, Private R. Thrower (Norwich), R. Cantrell, I.S.O., J. O'Brien, Dr. Stafford Jackson, G. J. Bell, F. C. Ryan, T. A. Rae, I.D.S., R.C.S.I., Mr. and Mrs. W. Little, Chas. Allen, Francis M. Powell, G. J. Crampton, T. A. Crampton, Fred Hanna, C. M. Griffin, Sir Stewart Woodhouse, J. C. Swift McNeill, M.P., J. K. Thompson, W. Russell, G. P. Richardson, M. Darby, A. L. DeReney, Albert Shaw, J. S. McCann, R. B. Freeman, W. H. Wilkinson, Walter Russell, F. C. Mason, J. Doyle, J. J. Kelly, J. D. Richardson, M. Barlow, Mr. Charles Green, Fisheries Branch, Mr. J. A. Launghier, Professor E. J. McWeeney, M.D., Major W. S. Houghton R.A.M.C. All the students of the Royal Veterinary College of Ireland also attended and marched from the house to the Church, afterwards accompanying the funeral to the graveside.

The following sent wreaths:—Mrs. A. E. Mettam and family; Parents and Sisters; Tom, Maude and Flo.; W. H. Bloye; Professor and Mrs. J. F. Craig; Professor and Mrs. G. T. Dunne; Professor and Mrs. J. J. O'Connor; Professor T. G. Browne and Mr. G. E. Haines; The Students of The Royal Veterinary College of Ireland; The President, Members of Council, and Officers of The Royal College of Veterinary Surgeons; Col. Rutherford, Major Taylor, and Veterinary Officers of the Irish Command; The Veterinary Staff of the Department of Agriculture and Technical Institute for Ireland; The President and Council of The Royal Zoological Society of Ireland; The North of Ireland Veterinary Medical Association; The Veterinary Medical Association of Ireland; Mr. and Mrs. Chas. Allen; Mr. and Mrs. J. McKenny; D. Kehoe, South Africa; P. P. Platt, M.A.; Mrs. and Miss Murphy; Private R. C. Thrower and Kate.

MR. ALBERT WILLETT.

WE much regret to announce the death of Mr. Albert Willett, who, after many months of suffering borne with exemplary patience, passed peacefully away at his residence in the Gresham Road, Staines, on the morning of the 19th ult. For many years he successfully practised as a veterinary surgeon in the district, where he was widely known and respected. Of late years he had lived in well-earned retirement, and the practice which he founded is still being carried on by two of his sons, F. W. and A. E. Willett. The deceased leaves behind to mourn his loss a widow and five surviving children, three sons and two daughters, viz.: Mr. F. W. Willett, M.R.C.V.S., of Staines; Mr. John Willett, of 6, Harley Place, London; Capt. A. E. Willett, A.V.C., who is now in charge of a mobile section in Salonica; Mrs. F. Tims, of Reading; and Miss Willett, who is at present staying with relatives in the United States; and there are nine grandchildren. The deceased gentleman was one of the older generation of whom very few are left, and had resided at Staines for 76 years. Although he took no part in the public affairs of the town, he will be sadly missed by many friends.

The funeral took place on the 22nd November, the first portion of the service being conducted at St. Peter's Church, and the interment being in St. Mary's Cemetery.

NOTICES.

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"Annual Report on the Civil Veterinary Department, United Provinces," 1916, 37.

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"Camel and its diseases" (H. E. Cross—Baillière, Tindall and Cox), 441.

"Diseases of the Dog and their Treatment" (Muller & Glass—Baillière, Tindall & Cox), 107.

"Epizootics and their Control during War" (Miessner—A.V.M. Publishing Co.), 413.

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AUSTRALIAN SUPPLEMENT

OF THE

“VETERINARY JOURNAL.”

By Members of the Staff of the Veterinary School,
Melbourne University, Australia.

WHAT HAS THE VETERINARY PROFESSION DONE FOR AUSTRALIA?

Notwithstanding the long-delayed recognition of the services of veterinary surgeons to the stock-owning and general public it must be admitted that, especially during the last twenty-five years, our profession has put up a grand record in Australia. The veterinary inspection of all imported stock has prevented the introduction of any new diseases. The importance of this inspection is well exemplified in the detection by Mr. Edward Stanley, F.R.C.V.S., of glanders in a troop of circus horses that had been brought over from America. The affected horses were immediately destroyed, and the rest quarantined effectively on an island, and the disease prevented from entering the State.

The early diagnosis of pleuro-pneumonia by the late Mr. Henry Wragge, and the strong warning by him against allowing the disease to spread—though his warning was not observed—is worthy of permanent record.

The recognition of an outbreak of foot and mouth disease by the late Mr. Graham Mitchell, in 1872, and the immediate destruction of the affected herd, effectually arrested further spreading of the disease, and the amount thus saved to the country is incalculable. Mr. Mitchell also introduced and extensively practised inoculation for the protection of pleuro-pneumonia. He also, assisted by the writer, commenced the cultivation of calf lymph for the vaccination of children, which is still carried on at the Royal Park depot.

After receiving instruction from Pasteur's representatives, Messrs. Germont and Loir, who came out to New South Wales to introduce vaccination against anthrax, I commenced the cultivation of tubercle-free pleuro virus on calves, and continued to use it and supply it to stock-owners for several years, with the result that pleuro-pneumonia was practically stamped out of the herds of Victoria, and the possibility of tuberculosis being spread by means of tainted pleuro virus greatly reduced.

By obtaining the Veterinary Surgeons Act, and providing for the registration of all qualified veterinary surgeons, stock-owners could

protect themselves from the imposition of unqualified practitioners, while the establishment of a veterinary college has been the means of saving the lives of thousands of valuable animals and much wealth to the community.

The introduction of tuberculin testing for tuberculosis in cattle, and its frequent use by members of the profession in detecting the disease in its most latent forms, has led to an enormous reduction in the prevalence of that disease in cattle, and indirectly of that of many human beings.

Inoculation for the prevention of blackleg in calves has been the means of preventing much loss to dairymen from that disease.

The general outbreak of swine fever in 1901 was practically stamped out in Victoria in three months, through every qualified veterinary surgeon in the State being appointed an inspector, and acting under my instructions.

Original Communications.

NOTES ON THE EARLY HISTORY OF THE VETERINARY PROFESSION IN VICTORIA.*

By W. TYSON KENDALL, D.V.Sc., H.A.R.C.V.S., M.R.C.V.S.

FIRST ATTEMPT TO SECURE STATE VETERINARY SCHOOL.

IN 1882 the Veterinary Association succeeded in obtaining, through the then Minister of Lands, the Hon. Walter Madden, a small piece of land in the old police paddock at Richmond, as a site for a Veterinary School or College. Although the site was much too small for the purpose, we were glad to get it, in the hope that we might be able to exchange it at some future date for a more suitable one. In this, however, we were disappointed. When it was found that we had made no use of it, and being further influenced by a deputation of Richmond residents who objected to a veterinary college being established in their midst, the Government cancelled the grant. It will be of interest to relate that Mr. G. Mitchell had, on his own initiative, instructed an architect to draw plans of the proposed college, and the Veterinary Association was served with an account for plans and specifications. The association, having had no say in the matter, denied liability; thereupon Mr. Mitchell was personally sued for the amount, and was ordered by the Court to pay the amount and costs. This broke up the association, and some years elapsed before another was formed.

In consequence of representations I had made through the Press

* Continued from page 37, Australian Supplement in October, 1916, issue of VETERINARY JOURNAL.

as to the great prevalence of tuberculosis amongst cattle slaughtered for human consumption, and demonstrations made before the officers of the stock department, the matter was brought before the Upper Chamber by the late Hon. James Buchanan, of Berwick, and a Royal Commission was appointed to enquire into it. A voluminous report of the evidence taken was published, together with numerous photographs of meat affected with different stages of the disease. As an outcome of this, a staff of inspectors was appointed to inspect at the abattoirs and markets, and it was also decided to appoint a qualified veterinary surgeon to inspect the City Abattoirs and take statistics of the number of diseased animals slaughtered, and the diseases, etc. Unfortunately, no suitable applicant turned up, and the appointment was never made.

During the next few years the profession in Melbourne received some additions, viz., Messrs. Goule, Cohen, Wragge, and Sharp, all of whom settled here. This accession led to the formation of another Veterinary Association, which immediately took up the question of framing a Veterinary Surgeons Bill, to enable stock-owners to distinguish between qualified and unqualified men, and to protect the interests of the profession. This Bill was based chiefly on the then existing English Veterinary Surgeons Act, and, as secretary of the association, it fell to the writer's lot to make the rough draft. The Bill was brought before Parliament by the late Mr. Bosisto, M.P., and passed after receiving some additions at his hands from the Pharmacy Act, and further changes in the Upper House, particularly the introduction of a most important clause, at the instance of the late Hon. Dr. Beaney, providing for a four years' course.

ESTABLISHMENT OF THE VETERINARY COLLEGE.

Owing to a promise being made to Mr. Bosisto that, in the event of the Veterinary Surgeons Bill being passed, an early attempt would be made to establish a Veterinary College, and receiving no help from the Government in regard to providing a suitable site or funds to erect the necessary buildings, as well as lack of interest in the matters displayed by my colleagues, I determined to try what I could do single-handed.

The first step was to obtain the signatures of all the leading horse-owners, stock and station agents, medical men, and others in Melbourne, to a requisition to the City Council praying that a college might be erected on the market reserve adjoining the Horse Market, Sydney Road, Parvville, being part of the reserve on which the new University Veterinary School now stands.

The requisition was signed by a large number of people, and duly presented to the City Council, who received it very favourably, and

submitted it to the legislative committee to be dealt with. Unfortunately, it was discovered that they held the land in trust for market purposes only, and without special legislation it could not be used for any other purpose.

This scheme was, therefore, abandoned; but, having been assured by some of the leading members of the Government that if it could be shown that such an institution was a necessity, and students forthcoming, assistance would be given, I determined to establish a private college. In 1885 I had purchased the site of the old college, and immediately opened a veterinary hospital. Not, however, without considerable difficulty was it established. Owners of sick animals had not been accustomed to send them to a hospital for treatment, and for the first year I found it necessary to buy the patients in many instances, and sell them, at a good profit, either to the original owner or someone else. Nevertheless, in a couple of years it was no unusual thing to have thirty or forty patients in at a time.

In 1886 the college buildings were erected, but the institution was not opened for teaching purposes till January, 1888. A curriculum was arranged in accordance with the regulations of the Act, and Mr. E. Rivett, M.R.C.V.S., and Dr. Joyce, having been engaged to assist in teaching, classes were opened and six students entered. The teaching staff was added to as the necessity arose. Amongst the new additions were Mr. C. Vyner, M.R.C.V.S., Mr. S. S. Cameron, M.R.C.V.S., and Professor McBride, Ph.D., M.R.C.V.S., and Mr. A. Goule, M.R.C.V.S. During the first year, students attended the College of Pharmacy for chemistry and materia medica; but, in consequence of Professor Jackson severing his connection with that institution and afterwards engaging to teach at the Veterinary College, a libellous article appeared in the *Pharmaceutical Journal* depreciating the latter institution, and this led to an action at law, and the Pharmaceutical Society was mulcted in damages to the extent of £416 and costs. This action was an important event in the history of the College, and was rendered necessary on account of the fact that the Veterinary Board had withdrawn its recognition of the teaching, and refused to appoint examiners to examine the students in consequence of the article referred to. The effect of the verdict on the Veterinary Board was electrical. At its next meeting, a resolution was passed recognising the teaching, and it was decided to appoint an Examining Board.

After that things went more smoothly for a time. It would occupy too much time to relate the many ups and downs of the old college. Suffice it to say that the Veterinary Board always obtained the best available examiners, often seeking aid from Sydney, and that,

from the first, a high standard of efficiency was insisted upon, with the result that graduates have established a status for the profession that many countries might envy.

Another event—which occurred in 1891, and caused a considerable amount of anxiety for a time—was an effort on the part of an association formed by a section of the profession to obtain a site and funds to establish a State Veterinary School. The Association so far succeeded as to obtain a site at Spotswood, and negotiations were opened with me in order to have the teaching transferred to the proposed State Institution. As the site was a most inconvenient and unsuitable one, I strongly opposed it, feeling certain that failure would be sure to follow if such a transference took place. The scheme was abandoned, and it was hoped that a better site would have been substituted; but nothing further was accomplished till the City Council generously granted the site of the present University Veterinary School, in Parkville, and at the instance of the Hon. George Swinburne, then Minister of Agriculture, the Government provided the necessary funds to build and maintain the new institution. To Dr. Cameron is due the credit of inducing the Minister to make the grant.

So, after struggling on for twenty years, the old college gave place to the new school, and a new regime under the University Council is now in full operation.

During the old regime two applications were made to obtain affiliation with the Royal College of Veterinary Surgeons, the first by myself, as principal of the College, in 1896, and the second by the Veterinary Board, in 1898, and in both instances the reply was that the only bar to this recognition was the absence of a matriculation examination, which had not been provided for in the Veterinary Surgeons Act of Victoria.

The function of the Veterinary Board has been to administer the Act, and its main duties have been to appoint examiners to examine the students, to register graduates of recognised veterinary schools and colleges, and practitioners who had practised as veterinary surgeons for seven years immediately preceding the passing of the Act, and also to prosecute persons infringing any of the provisions of the Act.

The disclosures in reference to the large numbers of diseased animals slaughtered at the various abattoirs led to inspection of the principal slaughterhouses, and more recently the Meat and Dairy Supervision Acts, for which the late Dr. Creswell, Chairman of the Board of Health, and Dr. Cameron were responsible, has been of the utmost value in securing a wholesome food supply for the people and also for export.

The establishment of both Commonwealth and State Veterinary

Departments has been the means of getting all the most serious animal diseases under control, of educating stock-owners to the necessity of keeping their flocks and herds free from disease, and by adopting the system of inspecting and certifying to the soundness of stallions, the soundness and stamina of our horses is being gradually improved.

Australian graduated veterinary surgeons now occupy important Government and other public positions in every state in the Commonwealth as well as in New Zealand, the Straits Settlements, and in London. A large number are doing good work in private practice and there is a continual demand for good men in both private and public positions.

During the Boer war some fifteen or sixteen were on active service for the Imperial Government, and were highly appreciated by the Imperial officers, some being retained after the war was over.

The establishment of a University Veterinary School and Veterinary Research Institute are matters of more recent date.

As may be imagined, the question of dealing with applications for registration of men alleged to have practised during the prescribed period has been a frequent source of trouble, and sometimes of expensive litigation. But, on the whole, the Board has carried out its duties fearlessly, both in regard to refusing registration to applicants whom it considered ineligible, and in prosecuting persons for illegally practising, and the members of the profession, in spite of occasional grumbling about unregistered persons practising, are well protected in Victoria, and stock-owners, on the other hand, need not be imposed upon by unqualified men. It is gratifying to know that the other States are following Victoria's example, and it is to be hoped that ere long there will be uniform legislation, or something approaching it, throughout the whole Commonwealth.

THE VIABILITY OF *MELOPHAGUS OVINUS* LINN., THE SHEEP LOUSE-FLY, SHEEP KED, OR SHEEP-"TICK."

By GEORGINA SWEET, D.Sc., AND H. R. SEDDON, B.V.Sc.

Veterinary Research Institute, Melbourne,

IN view of the very considerable differences which exist in Australia, it has been the desire of the authors for some time to test, for the purpose of confirmation or otherwise, the currently accepted statements with regard to the conditions determining the life histories and the effects of animal parasites. The truth or otherwise of these statements under Australian conditions obviously influences the value of the Government regulations for the extermination of these parasites or for prevention, based on these statements of what takes

place under the conditions found in the several parts of the Northern Hemisphere. However, chiefly owing to war conditions and the claims of other duties, the opportunity and suitable material have not been forthcoming at the same time. One of these parasites, of some importance in a sheep-raising country such as Australia, is *Melophagus ovinus* Linn., the special point requiring earliest determination being the length of time during which the parasite may remain alive off the animal and without food.

Late in November of this year (1916) some unshorn sheep obtained for use in other experiments were found to have a considerable number of these louse-flies in the fleece, and the experiments herein recorded were carried out.

The first intention was to do three parallel sets of experiments—one now, at the beginning of a summer which has so far been very wet and mild; another early in February, when hot, dry condition may be expected to prevail; and in midwinter, when wet and cold. In this way it was hoped to test them under all the possibilities of varying conditions. However, this first set has proved so interesting, and so emphasised the truth of the opening remarks of this communication, that we have thought it desirable not to wait for the conclusion of the three sets of experiments before publishing the results of this.

In the literature on the subject available to us here, the only records of definite experiments on this point which we have been able to find are those of Curtice¹ and Swingle.² In the former (1, page 41), "a dozen or more of these ticks, which were moderately well fed when taken from the sheep, were, with some wool, placed in a cotton-stoppered bottle and kept in a room with a temperature varying between 60° and 80° F. They all died in *less than four days* (the italics are ours). The leanest succumbed first, in about two days, while those that were better nourished gradually grew smaller and thinner, and lived little longer than the third day. Others, placed in wool over the damp soil of a geranium in a flower pot, died *within four days*. On the other hand, some young ones which were hatched out in a bottle were kept for nearly two weeks, or *until their daily feeding was neglected*. To feed them they were placed on the back of my hand." Swingle's "experiments on keeping ticks in boxes covered with gauze show that the sheep-tick's life off the sheep is very short. They were *all dead in four days* whether they were kept warm or cool. Young ticks before taking a meal can be kept a little longer, and in one case, years ago, the writer was able to keep a tick alive off the sheep *for seven days*. A large percentage of them will die within 48 hours" (2, page 22). He then records two experiments in which a total

of 283 ticks were all dead within four days. He concludes that "it is a false idea that the tick may drop the sheep and live for a long time in the grass or brush, and be picked up again by sheep, as is the case with the true tick." It will be noted that the conditions under which a "tick" was kept alive off the sheep for seven days are not given, but it would appear to be a young unfed "tick."

Various text-books and other publications refer more or less vaguely to the short time of life possible off the sheep, some quoting under four days: Herm³ remarks further (3, page 294) that "when off the sheep the insects die in from two to eight days, most of them dying in about four days."

There is, however, in none of these cases, any indication on whose authority or on what evidence the statement is based, other than one or two instances referring to Curtice's and Swingle's work. We have been unable to find any record of experiments reaching to eight days of life off the sheep.

DETAILS OF OUR EXPERIMENTS.

(I) *Conditions under which the "Ticks" were kept.*

A. *Receptacles.* The following places were prepared:—

I and II.—Sod of lawn grass in an open petri dish 14 cms. diameter with a glass chimney 6.4 cms. high and 6.2 cms. wide, firmly embedded in the centre of the grass. The grass was 2 to 4 cms. high. That portion of the sod outside the chimney was kept well moist, the water simply soaking into the enclosed portion.

III and IV.—Soil in open petri dish (provided with chimney as in I and II), well flattened down, and a quantity of leaves (dead) placed on surface. The soil was clayey loam, and would be about 2 cms. deep. The leaves were from $\frac{3}{4}$ in. to 1½ ins. long.

V and VI.—Same as III and IV, but with no leaves. The soil in VI was drier than in V, and the parasites soon became covered with dust.

VII and VIII.—Large open petri dish, 14 cms. in diameter, containing wool.

B. *Location of Receptacles.*

I, IV, VI and VIII were placed in a cellar partially lighted from the exterior.

II, III and V were placed in the quadrangle of the Institute on the lawn; this is surrounded by a one-storey building, except on part of the west side, where it rises to the height of a two-storeyed building. The receptacles were placed near the centre of the enclosed lawn. In this situation they were fairly well protected from any cold west winds, but they were fully exposed to any warm north wind. The receptacles were kept in the sunshine as much as possible. When the weather was showery a small table was placed over them to

protect them, and during the night, as the weather was unsettled most of the time, they were placed under a very low table in order that the rain should not beat in on them. At the same time they were freely exposed to the cold during the night.

VII was placed near the window on the bench in the laboratory facing the south.

C. Climatic Conditions.

The weather during the experiments was very unsettled. Rain, warm, north wind, cold S.S.W. winds, cool nights, thunderstorms, and warm, sunny days were all experienced during the experiment.

The following is a brief record of the weather each day:—

December 4th, 1916. Day fine, broken clouds and a light south to south-east wind.

„ 5th. Fairly heavy rain during the night, followed by a showery day. 6th. Day fine.

„ 7th. Strong northerly wind; day warm.

„ 8th. Day warm and humid, variable winds, chiefly northerly, and steady showers with some thunder.

„ 9th. Rain during the night. Day fine with moderate temperature, but rather sultry and at times cloudy.

„ 10th. Day fine but sultry.

„ 11th. Morning fine but sultry and threatening; afternoon wet and thundery with variable winds.

„ 12th. Day on the whole was fine, though cloudy at times. Little rain in afternoon when wind shifted to S-W.

„ 13th. Day fine. 14th. Day fine; cool. 15th. Day fine.

The readings were as follows:—

Date of Reading.	Cellar.		Lawn.		Laboratory Bench.	
	Max.	Min.	Max.	Min.	Max.	Min.
5-12-16	*61°	59°	*83°	50°	*68°	59°
6-12-16	60°	58°	82°	50°	63°	59°
7-12-16	60°	59°	91°	53°	70°	61°
8-12-16	72°	61°	96°	59°	80°	60°
9-12-16	64°	62°	80°	54°	74°	64°
10-12-16	62°	60°	86°	55°	76°	64°
11-12-16	62.5°	61.5°	90°	56°	76°	68°
12-12-16	68°	60°	98°	48°	78°	62°
13-12-16	62°	60°	88°	50°	74°	62°
14-12-16	62°	58°	88°	54°	68°	60°
15-12-16	60°	58°	88°	54°	66°	60°

* These temperatures were the maxima for 17 hours — i.e., since experiment was commenced.

Self-registering thermometers placed in each of the situations.

with the parasites were read daily at 9 a.m., and gave the maximum and minimum (Fahr.) during the previous twenty-four hours.

(2) *Selection and Distribution of Parasites.*

In all 151 parasites were collected from these lambs and at 4 p.m., December 4th, divided as follows:—

I, II, III, IV, V, VI, twenty parasites each. VII, sixteen parasites. VIII, fifteen parasites.

The parasites were taken indiscriminately from the sheep, but in distributing them care was taken to see that they had not been badly damaged in collection, that each was full of vigour, and that parasites of approximately the same size were placed in each. It was estimated that in each ten there were two distinctly small ones.

(3) *Periodical Counting of the Parasites.*

The parasites were distributed at 4 p.m. on December 4th, and were carefully counted at 10 a.m. each morning following, and after three days also at 4 p.m. in the afternoon. On each occasion any dead parasites were removed. The following is the record of the numbers living and dead after each morning's counting. The missing are retained in the daily tally; the dead are not. The number in "D" column represents the number which have died since the last count was made.

The following table gives the percentage of *viable* parasites in each receptacle throughout the experiment. It is admitted that the number of parasites in each is very few on which to base percentages; but, as will be seen, the figures for parasites kept under similar conditions approximate very closely. For this table the missing parasites are counted as dead.

Time.	Hours.	I	II	III	IV	V	VI	VII	VIII	Total.
	18	100.0	95.0	95.0	100.0	100.0	100.0	100.0	93.3	98.0
	42	100.0	95.0	90.0	100.0	25.0	100.0	37.5	80.0	92.6
	66	100.0	65.0	0.0	95.0	0.0	100.0	25.0	26.6	52.9
	90	90.0	25.0	—	90.0	—	95.0	0.0	6.6	40.0
(4 days)	96	90.0	20.0	—	80.0	—	90.0	—	0.0	36.9
	104	75.0	20.0	—	80.0	—	70.0	—	—	32.3
(5 days)	120	75.0	10.0	—	80.0	—	70.0	—	—	38.9
	138	40.0	0.0	—	60.0	—	70.0	—	—	22.4
(6 days)	144	30.0	—	—	55.0	—	65.0	—	—	19.7
	162	0.0	—	—	40.0	—	45.0	—	—	11.2
(7 days)	168	—	—	—	35.0	—	40.0	—	—	9.9
	186	—	—	—	35.0	—	20.0	—	—	7.2
(8 days)	192	—	—	—	35.0	—	20.0	—	—	7.2
	210	—	—	—	30.0	—	5.0	—	—	4.6
(9 days)	216	—	—	—	25.0	—	5.0	—	—	3.9
	233	—	—	—	15.0	—	5.0	—	—	2.6
(10 days)	240	—	—	—	5.0	—	5.0	—	—	1.3
	257	—	—	—	5.0	—	5.0	—	—	1.3
(11 days)	264	—	—	—	0.0	—	0.0	—	—	0.0

INFLUENCE OF APPARENT STATE OF NUTRITION ON THE VIABILITY OF THE PARASITE.

It was quite noticeable that, although a certain amount of shrivelling took place, this was not at all marked, and moreover the two last survivors when seen from below, even when dead, were far from being shrunken, though on the dorsal surface of the abdomen a slight shrinkage was evident. Moreover, some of those which looked quite shrivelled to begin with, and seemed almost dead then, survived quite a time. This is in clear contrast to the observations of Cooper Curtice, who states "the leanest succumbed first in about two days, while those that were better nourished gradually grew smaller and thinner, and lived little longer than the third day."

INFLUENCE OF SEX ON VIABILITY.

Unfortunately, the importance of this point was not realised till too late in this experiment to be of much use, but it is worthy of record that the last surviving ticks were males. It is proposed to make careful records in this respect in the next series of experiments.

VIABILITY OF PUPÆ.

Observations are in progress on this matter and will be incorporated in a later report.

SUMMARY OF EXPERIMENTS.

In view of the fact that in the previously recorded experiments in the Northern Hemisphere nearly all the parasites were dead within four days, it is interesting to compare the results obtained here. It will be seen on reference to the last tables that all the parasites in III (leaves on the lawn) and in V (bare soil on lawn) were dead in 66 hours; those in VII (wool on laboratory bench) were dead in 90 hours; those in VIII (wool in the cellar) were dead in 96 hours (four days); leaving, however, 36.9 per cent. of the original number still alive in I, II, IV, and VI.

Of these four, 80 or 90 per cent. were alive except in II (grass on lawn), in which only 20 per cent. remained viable. Evidently therefore some markedly favourable condition or conditions were present in these, especially in I, IV, and VI.

The next location in which all the parasites succumbed was II (grass on lawn), all being dead at 138 hours ($5\frac{3}{4}$ days). These were followed by I (grass in cellar), in which all were dead 24 hours later ($6\frac{3}{4}$ days). It is to be noted that at this period, 40 per cent. of the parasites in IV (leaves in cellar), and 45 per cent. of those in VI (bare soil in cellar) were still alive; at the end of 210 hours ($8\frac{3}{4}$ days) it will be seen that six parasites (30 per cent.) were alive in IV, but only one parasite (5 per cent.) was still alive in VI. Those in IV gradually died off till at the end of 240 hours (10 days) there was only one alive

VIABILITY OF MELOPHAGUS.

Date.	Hour.	Period of Experiment in hours.	I. Grass in Cellar.		II. Grass on Lawn.		III. Leaves on Lawn.		IV. Leaves in Cellar.		V. Soil on Lawn.		VI. Soil in Cellar.		VII. Wool in Laboratory.		VIII. Wool in Cellar.		Total.	
			L.	M.	D.	L.	M.	D.	L.	M.	D.	L.	M.	D.	L.	M.	D.	L.	M.	D.
4-12-16	4 p.m.	0	20	-	-	20	-	20	-	-	20	-	-	-	16	-	-	151	-	-
5-12-16	10 a.m.	18	20	-	-	19	11	-	-	-	20	-	-	-	16	-	1	148	1	2
6-12-16	10 a.m.	42	20	-	-	19	11	-	-	-	15	20	-	-	6	-	2	140	1	28
7-12-16	10 a.m.	66	20	-	-	13	-	7	0	13	5	20	-	-	4	-	8	80	1	40
8-12-16	10 a.m.	90	18	-	-	5	22	6	-	-	0	-	-	-	4	-	3	61	3	17
8-12-16	4 p.m.	96	18	-	-	4	1	2	-	-	-	-	-	-	0	-	1	56	2	6
9-12-16	10 a.m.	114	15	-	-	4	13	-	-	-	-	14	-	-	-	-	1	49	2	7
9-12-16	4 p.m.	120	15	-	-	2	13	2	-	-	-	14	-	-	-	-	-	47	2	2
10-12-16	10 a.m.	138	8	-	-	0	13	2	-	-	-	14	-	-	-	-	-	34	2	13
10-12-16	4 p.m.	144	6	-	-	-	-	-	-	-	-	13	-	-	-	-	-	30	2	4
11-12-16	10 a.m.	162	0	-	-	-	-	-	-	-	-	8	-	-	-	-	-	17	2	13
11-12-16	4 p.m.	168	0	-	-	-	-	-	-	-	-	8	-	-	-	-	-	15	2	2
12-12-16	10 a.m.	186	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	11	2	4
12-12-16	4 p.m.	192	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	11	2	2
13-12-16	10 a.m.	210	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	7	2	4
13-12-16	4 p.m.	216	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	6	2	4
14-12-16	9 a.m.	233	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	4	2	2
14-12-16	4 p.m.	240	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	2	2
15-12-16	9 a.m.	257	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	2	0
15-12-16	4 p.m.	264	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	0	2	2

L = Living.

M = Missing.

D = Dead.

¹ This parasite turned up on 7-12-16. ² One of these turned up next day. ³ This parasite was never found.

there, and this, with the remaining parasite in VI, was still alive at 257 hours; both were dead, however, seven hours later.

This may be summarised as follows:—

I	Moist grass in cellar	..	all were dead in $6\frac{3}{4}$ days.
II	Moist grass on lawn	..	" " $5\frac{3}{4}$ "
III	Dead leaves on soil on lawn	" "	$2\frac{3}{4}$ "
IV	Dead leaves on soil in cellar	" "	$11\frac{3}{4}$ "
V	Bare soil on lawn ..	..	" " $2\frac{3}{4}$ "
VI	Bare soil in cellar ..	..	" " II "
VII	Wool in laboratory	..	" " $3\frac{3}{4}$ "
VIII	Wool in cellar ..	..	" " 4 "

It is obvious that the *least* favourable conditions and location for the survival of these parasites of the sheep and without food, in these experiments, was the bare soil on the lawn exposed to the current conditions of weather; the next was the dead leaves on soil on the lawn under similar conditions; next was the wool on the laboratory bench, where there were no extremes of temperature; next was the wool in the cellar, the temperature here being lower uniformly than with the previous lot of parasites; next was the moist grass on the lawn, where, although the parasites were subject to a wide range of temperature and weather they were supplied with moisture; the next was the moist grass in the cellar; the next was the bare soil in the cellar; and the next—*i.e.*, the most favourable situation—the dead leaves on soil in the cellar. In these three last, under evidently the most favourable conditions, the one common condition was that of moderately cool, uniform temperature. Dryness is evidently more favourable to survival than moisture, and it is possible that a slight shelter given by the leaves may have been helpful, though it is difficult for us to think so, since the parasites were not particularly partial to the underside of the leaves, frequently rather the reverse. Exposed to direct sunlight, where the temperature on some days exceeds 90° , it is evident that the parasites require moisture.

CONCLUSIONS.

We do not feel justified in drawing extensive conclusions from this one set of experiments, but so far as they go they seem to show—

(1) That a moderately cool, uniform temperature is the most favourable condition for the persistence of the "tick" off the sheep and without food, especially if it be dry.

(2) If extremes of temperature be present then moisture is necessary, dryness soon proving fatal.

(3) The life of "ticks" in shed wool is short under uniform temperature whether cool or moderate.

(4) The state of nutrition does not seem to have influenced the viability of these "ticks."

REFERENCES.

¹ *Curtice, Cooper*.—"Animal Parasites of Sheep." Department of Agriculture, Bureau of Animal Industry. 1890. pages 39-43.

² *Swingle, Leroy D.*—"The Life History of the Sheep-Tick (*Melophagus ovinus*)."
University of Wyoming Agricultural Experimental Station. "Bulletin," No. 99, July, 1913, pages 1-24.

³ *Hermes, William B.*—"Medical and Veterinary Entomology." New York, 1915.

Clinical Cases.

A CASE OF SPLENIC ABSCESS, SECONDARY TO INVASION OF THE STOMACH WALL OF A HORSE BY SPIROPTERA MEGASTOMA.

By CAMPBELL G. DICKENSON, B.V.Sc.,

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Subject.—Grey gelding; seven years old.

History.—On December 14th, 1915, the horse was operated on for the removal of a "swamp cancer" from the inside of the near hind leg, between the hock and the fetlock. The cancer commenced to grow again a week after the operation, and ultimately became about three times the original size. On Tuesday, 28th, the patient was put on the iodide of potassium treatment, and was treated with this drug continuously, with the exception of one or two short breaks, up to the time of death.

The horse commenced to fall away in condition soon after being operated upon, though fed on good fodder, and on Monday, May 29th, 1916, he fell down, and was unable to rise without assistance. When once up he was able to support himself. For another week he continued in this condition, and on Tuesday, June 6th, he was found dead.

Throughout the course of treatment the horse gradually fell away in condition, but retained a good appetite up till the morning before he died. No symptoms of any kind were displayed, and the action of the bowels was regular; and the poor condition was put down to the effects of the cancer and the prolonged administration of the iodide, since cancerous horses become low in condition sooner or later.

Post-Mortem.—About two gallons of peritoneal fluid, slightly reddish in colour, was found when the abdominal cavity was opened.

The intestines were fairly empty, but were normal in themselves, and a large number of nematode worms (*Strongylus* spp.) were found in the cæcum.

The kidneys and liver were normal. The spleen was greatly enlarged, and had assumed an almost square shape. It measured

18 inches by 18, and was eight inches thick at its thickest part. It weighed 16 pounds. Numerous septic foci were scattered over the surface.

On section the pulp was dark red and congested, though not soft. Many septic foci were exposed, and a large abscess, surrounded by necrotic and putrid tissue, and about six inches in diameter, was found in the region where the spleen was attached to the greater curvature of the stomach. In the stomach wall were two or three small tumours, and one large one (six inches in diameter, and one and one-half to two inches thick) on the greater curvature at the splenic attachment. In the clefts of the tumour numerous small nematode worms (*Spiroptera Megastoma*) were found, and on section the tumour proved to be purulent in the centre due to a staphylococcic infection.

The occurrence of *Spiroptera Megastoma* in horses has been noted on various occasions, and this parasite has generally been mentioned in the annual reports of the Veterinary Department as being one of the more common endoparasites of the horse in the Northern Territory; but this is the first case that has come under the writer's notice in which a splenic abscess has been found as a secondary infection.

This record of the above case is of interest following the report in a previous Australian supplement of numerous cases of splenic abscess in Victoria. As the case is reported from the extreme northern part of Australia it is thus probable that the condition has a wide distribution in the continent.

CESARIAN SECTION ON A BRAHMIN HEIFER.

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At the Melbourne Zoological Gardens an endeavour has been made to obtain a hybrid by crossing a Brahmin heifer and a Bison bull, and success attended the attempts, inasmuch as the period of gestation was about completed, although the abdomen of the heifer appeared extremely distended when the signs of impending parturition were shown.

Straining and redness of the vulva continued for about four or five days, then commenced to pass off, when it was deemed advisable to interfere if the life of the calf was to be saved.

On examination it was found that the calf was not larger than usual, and that the distension of the abdomen was due, not to enlarged foetus, but to hydrops amnii, with the ventral surface of the abdomen almost reaching the ground.

In the ordinary course of events, where the life of the mother is the most important consideration, delivery could have been most easily effected by dilatation of the cervix and rupture of the membranes. This we considered might prejudice the life of the calf if delivery

was not immediately effected, and as the life of the calf in this case was of more value than that of the mother, section of the uterus was the course decided upon.

The heifer was chloroformed, after being cast, the right flank being uppermost, and a wide area prepared for operation in the usual way. An incision about a foot in length was made in the right flank, following the direction of the fibres of the external oblique abdominal muscle, and a gridiron opening made through the remaining muscle strata, the peritoneum of necessity being opened along with the transverse muscle. This exposed the uterine walls, through which a small incision was made in an area devoid of cotyledons to release the amniotic fluid.

Many gallons of this was then run off, then the opening in the uterus increased in size, avoiding the cotyledons and controlling the bleeding from walls of the uterus by broad ligament forceps. The foetus was grasped and withdrawn, the umbilical cord being ligatured in two places and divided.

One would have preferred to remove the whole of the placental tissue at the time of operation, but the prospect of stripping adherent placenta from seventy or so cotyledons is not a hopeful one, with the chance of severe hemorrhage almost a certainty. The cut, ligatured end of the umbilicus was therefore returned to the cavity of the uterus and the opening closed, first by a layer of simple, continuous sutures, and this inverted by a strong, continuous sero-muscular stitch, thus closing the incision by the Czerny-Lembert method.

The peritoneum and muscle layers was then closed in the usual way and the edges of the skin approximated by silkworm gut. All the buried sutures were of chromicised No. 4 catgut.

No exudate collected in the wound and the external stitches were removed at the end of fourteen days. The removal of the membranes was a matter of greater difficulty, and though a portion of them were removed, at the end of a few days, *en masse*, the bulk of them came away slowly by decomposition, a process delayed by constant irrigation of the uterus with antiseptic solutions.

The case was instructive in showing that the membranes can be left in the uterus for the time being, and further that by inverting the edge of the wound as in bowel suture provisional union is strong enough to prevent leakage into the peritoneal cavity when decomposition of the membranes is set up.

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